CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

This chapter describes the proposed wind energy generating facility, transmission tie-line, and Western's electrical switchyard and includes information about how the location of the wind energy generating facility was selected, as well as specific details of the site, facilities, construction activities, site access, and operation and maintenance activities. Alternatives are also described, including an alternative routing for the proposed transmission tie-line, no action alternative, and alternatives considered but eliminated. A summary is provided at the end of this chapter outlining Resource Protection Measures (RPMs) that are proposed to mitigate associated impacts.

The project is located in Coconino County, Arizona, approximately 18 miles southwest of Winslow and 28 miles southeast of Flagstaff (refer to Figure 1.1-1).

The scope of the review for this EIS includes all proposed project components of the up to 500 MW wind project and related infrastructure.

2.1 FEDERAL AGENCY PROPOSED ACTIONS

The proposed Federal actions evaluated in this Final EIS by each of the involved Federal agencies are specific and limited and are based on the purpose and need for agency action as described in Section 1.2.2. Proposed actions are as follows:

- Western: To approve Foresight's interconnection to Western's transmission system on the Glen Canyon-Pinnacle Peak 345-kV transmission lines, an action which also requires a new Western switchyard on Forest Service-managed lands. Although the switchyard would be constructed, owned, and operated by Western, details of the proposed switchyard are grouped under Section 2.2, Foresight's proposed project.
- Forest Service: To approve Foresight's special use permit authorizing a 200-foot-wide right-of-way to accommodate the construction, operation, and maintenance of a portion of a new 345-kV electrical transmission tie-line corridor across approximately 8.5 miles of Forest Service-managed lands (see Section 2.2.2 for a detailed description of the proposed transmission tie-line), as well as an approximately 15-acre parcel to operate and maintain a new Western switchyard (see Section 2.2.3 for a detailed description of the proposed electrical switchyard).

Western's preferred alternative is to approve Foresight's interconnection to Western's transmission system, including constructing the new switchyard to accommodate the interconnection. The Forest Service preferred alternative is Foresight's proposed project.

The decisions of both Western and the Forest Service will be documented in separate Records of Decision (RODs) and published in the Federal Register.

2.1.1 Western System Modifications

In response to the interconnection request, Western completed an Interconnection Feasibility Study, Interconnection System Impact Study, and Interconnection Facilities Study. Based on this study work, Western proposes to modify its transmission system as described in Section 2.2.3 with the addition of an electrical switchyard within the current and extended rights-of-way of the existing Glen Canyon-Pinnacle Peak 345-kV transmission lines. Foresight does not currently have a pending transmission service request with Western.

If, and when, Foresight makes a request for firm transmission service, Western would conduct appropriate studies to evaluate the request based upon the system conditions existing at that time. These studies could identify additional upgrades needed to accommodate the transmission service needs, including modifications at other existing Western substations that could include, but would not be limited to, installing new control buildings; new circuit breakers and controls; adding new electrical equipment, which would include installing new concrete foundations for electrical equipment and buildings, substation bus work, cable trenches, buried cable grounding grid, and new surface grounding material; and/or replacing existing equipment and/or conductors with new equipment and/or conductors to accommodate the requests for transmission service.

In the event that transmission system modifications/additions are required in order to meet a request for Firm Transmission Service from Foresight's generating facility, a separate NEPA process would be initiated and conducted for these facilities at the transmission service requestor's expense.

2.2 FORESIGHT'S PROPOSED PROJECT

Foresight proposes to construct and operate a utility scale wind energy generating facility on private and State trust land. The wind energy generating facility would generate up to 500 MW of electricity from wind turbine generators (WTGs).

The proposed project includes the following three main components, depicted on Figure 2.2.-1:

1. Wind energy generating facility (wind park)
2. 345-kV transmission tie-line
3. 345-kV interconnection switchyard—constructed, owned, and operated by Western (switchyard)

The wind park would, most likely, be constructed in two or more phases, if fully built out to 500 MW. The majority of the wind park components would be constructed concurrently for an initial phase, including new or improved site access and service roads, an Operations & Maintenance (O&M) facility, and up to two step-up substations. The number and timing of phases, and the number of turbines and size of each wind park phase, would be determined at a later time based on additional wind assessment, turbine model selection, and one or more power market agreements.

For ease in describing the proposed wind park, transmission tie-line, and switchyard, each of the three components is discussed individually in this chapter. Descriptions include site survey activities, construction activities, operation and maintenance activities, decommissioning activities where applicable, and a summary of construction and operation related ground disturbance.

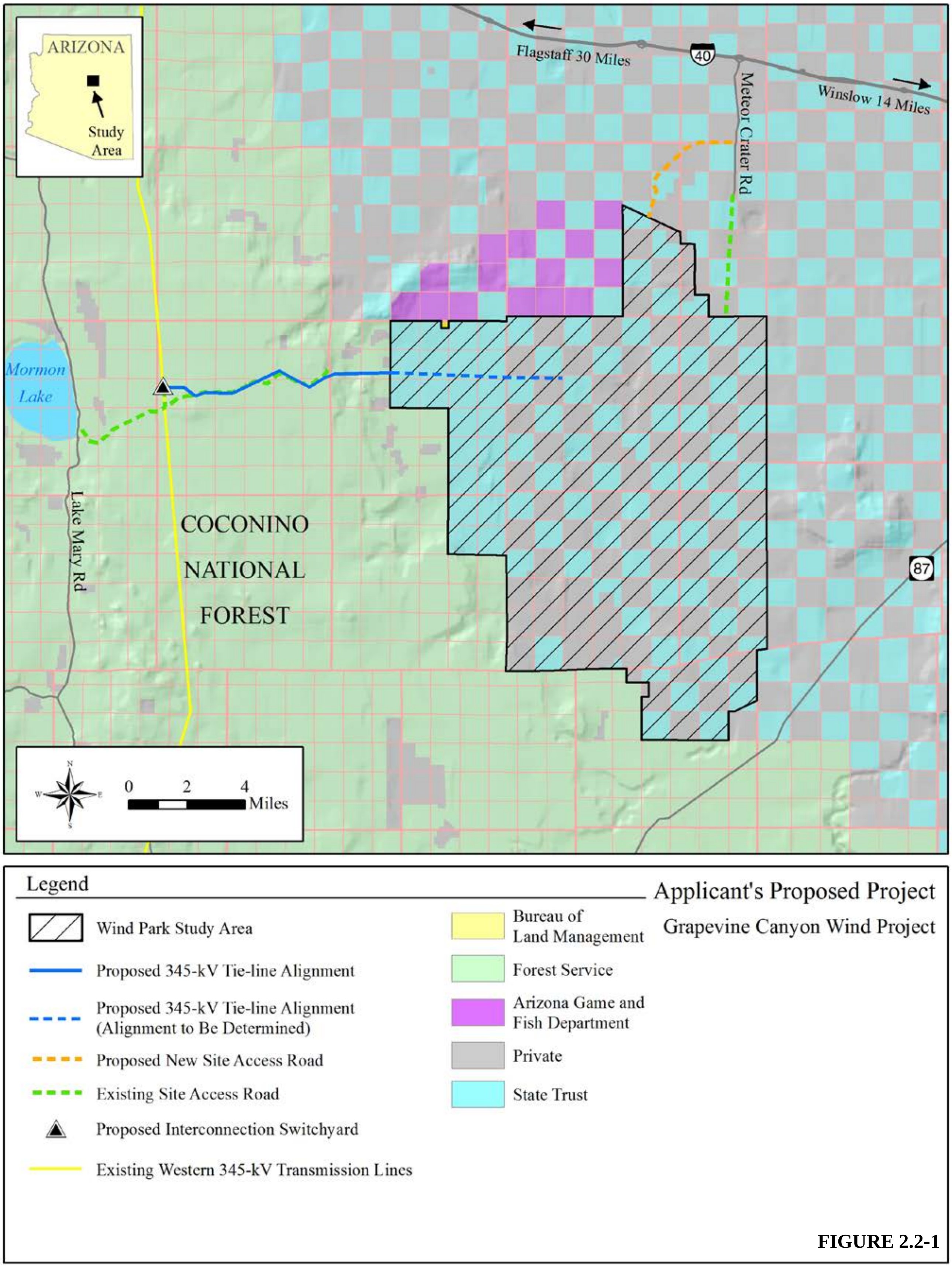
Wind parks are found throughout the United States and are typically sited in locations with strong prevailing winds. In Arizona, areas suitable for the development of utility-scale wind parks are generally located in the northern portions of the State. The screening process used to select the Grapevine Canyon Wind Park considered the following criteria:

- Availability of undeveloped wind resources suitable for utility-scale wind energy generation in a region that can serve power markets with portfolio standards.
- Suitability of site-specific conditions based on meteorological tower data and wind analysis.
- Ability to secure options for real property rights on contiguous lands suitable for wind energy generation.
- Ability to locate a wind project in an area where the County Comprehensive Plan cites wind energy as a viable land use.
- Location with transmission access to markets and utilities seeking to procure renewable energy.
- Availability of cost-effective transmission access.
- Proximity to interstate highway system for equipment transportation and site access.

Another critical factor in identifying the Grapevine Canyon Wind Park included its proximity to a 345-kV electrical transmission line corridor. The corridor includes the Glen Canyon-Pinnacle Peak No. 1 and No. 2 345-kV transmission lines, both owned and operated by Western. The transmission lines have capacity available to transmit additional electricity.

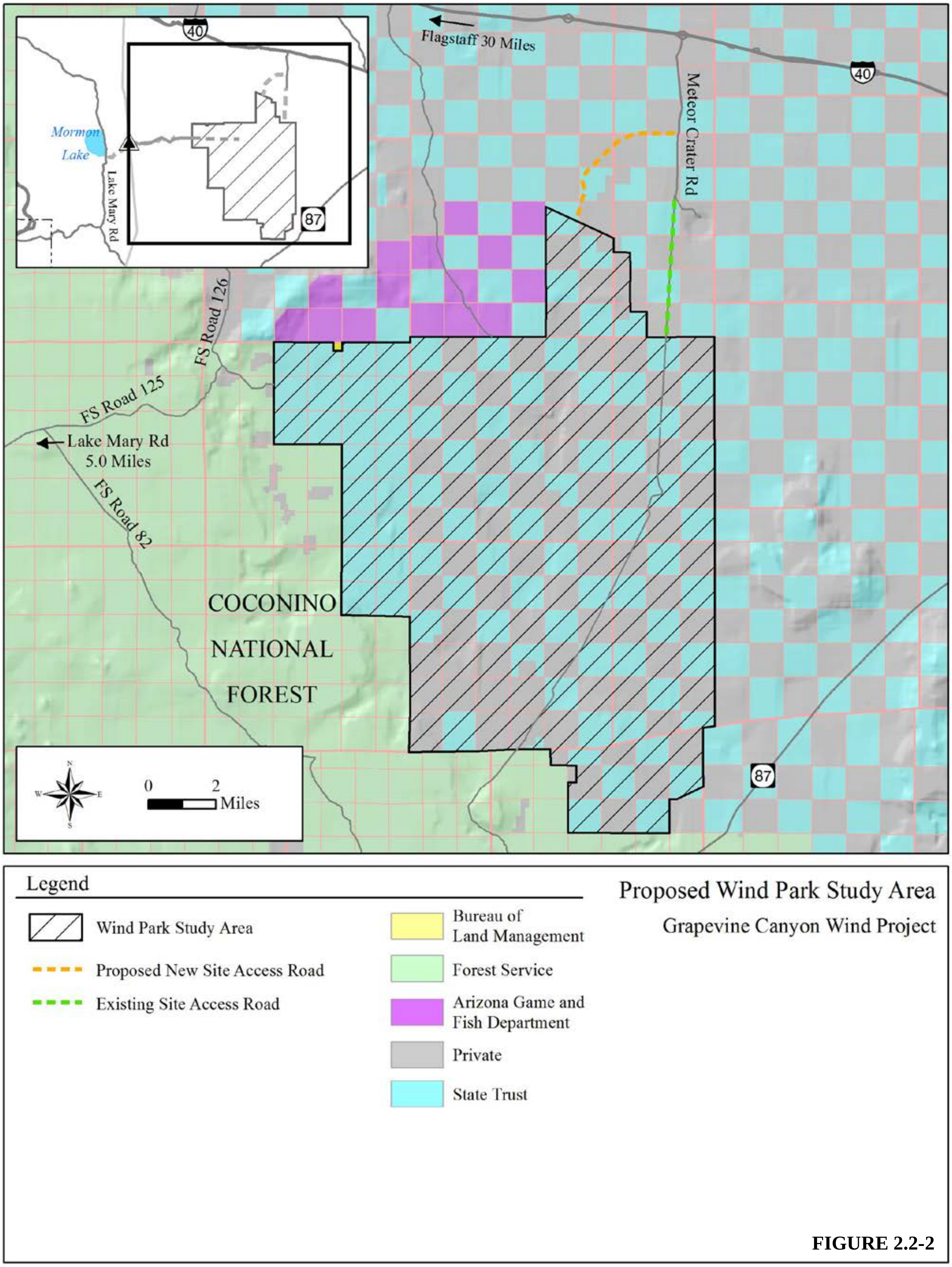
For the purposes of this EIS, the terms study area and project site are defined as follows:

- Study Area: The study area encompasses lands under evaluation for determining project site areas and specific locations for the wind park, transmission tie-line, site access, and switchyard (Figure 2.2-2). The study area includes all lands that would be defined in the future for the project site per phase (defined below). The study area covers approximately 150 sections of land, or approximately 150 square miles (approximately 96,000 acres). This study area substantially exceeds lands anticipated to be disturbed for the various wind park facilities. Construction of the wind park up to the proposed 500 MW is expected to temporarily disturb 2,050 to 2,193 acres and permanently disturb 555 to 570 acres of land. All wind park facilities would be located within the wind park study area in project site areas determined per phase.
- Project Site: The project site would comprise areas that would be directly disturbed by each phase of the wind park, transmission tie-line, and switchyard (see Table 2.2-1). The project site would be concentrated within a more limited portion of the broader study area. The project site would include the areas directly impacted by the placement of the proposed wind park, transmission tie-line, and switchyard as described below. The project site areas, including the exact location of wind park facilities, would be determined during final project design per construction phase, dependent on one or more power sale contracts. The exact location of wind park facilities (micro-siting) would be determined during final design, but the objective is that any such adjustments would be made to avoid or reduce impacts and would not increase impacts. To the extent that any pre-construction surveys provide information that minor adjustments in turbine siting or infrastructure would avoid or further reduce the impacts indentified in this Final EIS, feasible adjustments would be made to further avoid or reduce impacts to resources. Final (construction level) design and construction of all project infrastructure would be based on the following: (1) the estimated maximum disturbance and impact evaluations which are the basis for the analysis in the Final EIS, including the preliminary layout plan provided in this Final EIS; and (2) micro-siting resource information from the pre-construction surveys.
- Preliminary Layout Plan: The Final EIS includes a preliminary layout plan that depicts the planned infrastructure for the up to 500 MW project, as well as the preliminary layout plan for the project site area for the initial phase for up to 250 MW and the subsequent build-out phase project site area (Figure 2.2-3). The Final EIS includes a preliminary layout plan. For the environmental impacts analysis, resource specialists analyzed the range of potential impacts per resource for the up to 500 MW study area. The anticipated land disturbance and other impacts were addressed in the Draft EIS, based on the disturbance estimates in Table 2.2-4. For each resource, the maximum disturbance and/or impact was estimated. Subsequent to the Draft EIS, the preliminary layout plan was prepared to minimize and/or avoid impacts to resources including biological and cultural resources, and waters of the U.S. Utilizing the assumptions on land disturbance and other impacts prepared for the Draft EIS, the preparation of the preliminary layout plan involved the following tasks, which provided more detailed information: optimizing wind resources and incorporating additional meteorological information (as gathered between the time the Draft EIS and the Final EIS were prepared); further engineering analysis of the service roads and cabling/collection system and connection to the transmission tie-line; further analysis of construction to increase efficiency and decrease land disturbance; review of jurisdictional waters of the U.S.; survey of cultural resources for the transmission tie-line and interconnection switchyard on Forest-managed lands and the primary site access road; additional biological surveys (as conducted between the time the Draft EIS and the Final EIS were prepared); and adjustments to wind park infrastructure layout to reduce the amount of footprint/land disturbance to avoid or reduce resource impacts to sensitive resources.



ARIZONA
Study Area
Flagstaff 30 Miles
40
Winslow 14 Miles
Meteor Crater Rd
Mormon Lake
Lake Mary Rd
COCONINO NATIONAL FOREST
87
0 2 4 Miles
Legend
Wind Park Study Area
Proposed 345-kV Tie-line Alignment
Proposed 345-kV Tie-line Alignment (Alignment to Be Determined)
Proposed New Site Access Road
Existing Site Access Road
Proposed Interconnection Switchyard
Existing Western 345-kV Transmission Lines
Bureau of Land Management
Forest Service
Arizona Game and Fish Department
Private
State Trust
Applicant's Proposed Project
Grapevine Canyon Wind Project

FIGURE 2.2-1



40
Flagstaff 30 Miles
Meteor Crater Rd
Mormon Lake
Lake Mary Rd
87
FS Road 126
FS Road 125
Lake Mary Rd 5.0 Miles
FS Road 82
COCONINO NATIONAL FOREST
0
2
Miles
Legend
Wind Park Study Area
Proposed New Site Access Road
Existing Site Access Road
Bureau of Land Management
Forest Service
Arizona Game and Fish Department
Private
State Trust
Proposed Wind Park Study Area
Grapevine Canyon Wind Project

FIGURE 2.2-2

January 12, 2012 G:\Projects\Foresight\EIS\Preliminary-Turbine-Layout_Plan-EIS-11x17_Landscape_Ito150k.mxd

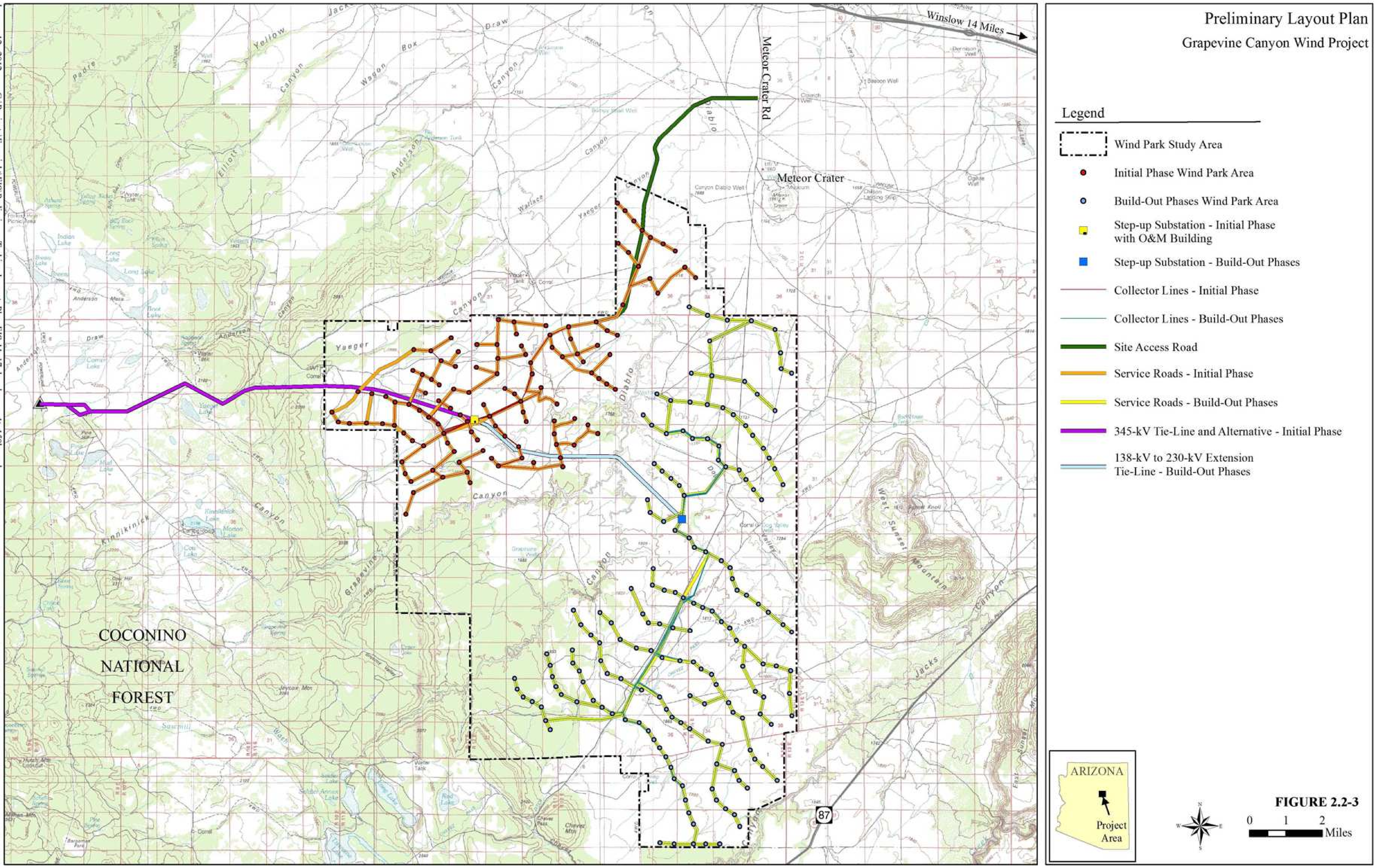


FIGURE 2.2-3

TABLE 2.2-1 LEGAL DESCRIPTION BY LAND OWNERSHIP FOR STUDY AREA*			
Land Ownership	**Section(s)**	**Township**	**Range**
Forest Service (approximately 220 acres)	10, 11, 12, 13, 14, 15, 16, 17, 18	18 N	10 E
	7, 8	18 N	11 E
Trust Lands administered by ASLD (approximately 50,965 acres)	2, 4, 10, 12, 14, 16	16 N	12 E
	1, 2, 11, 12	17 N	11 E
	2, 4, 6, 8, 10, 12, 14, 16, 18, 22, 24, 26, 32, 34, 36	17 N	12 E
	2, 10, 12, 14, 22, 24, 26, 34, 36	17 N	12.5 E
	1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 23, 24, 25, 26, 35, 36	18 N	11 E
	2, 4, 6, 8, 10, 12, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36	18 N	12 E
	2, 10, 12, 14, 22, 24, 26, 34, 36	18 N	12.5 E
	12, 14, 24, 26, 36	19 N	12 E
	2, 14, 26, 34	19 N	12.5 E
	34	20 N	12.5 E
Private (approximately 44,035 acres)	1, 3, 5, 9, 11, 15	16 N	12 E
	1, 3, 5, 7, 9, 11, 13, 15, 17, 18, 19, 20, 21, 22, 23, 25, 27, 28, 29, 30, 31, 33, 34, 35	17 N	12 E
	1, 3, 11, 13, 15, 23, 25, 27, 35	17 N	12.5 E
	1, 3, 5, 7, 9, 11, 13, 14, 15, 17, 19, 21, 23, 25, 26, 27, 29, 31, 33, 35	18 N	12 E
	1, 3, 11, 13, 15, 23, 25, 27, 35	18 N	12.5 E
	1, 13, 23, 24, 25, 35	19 N	12 E
	3, 11, 22, 23, 27, 34, 35	19 N	12.5 E
	35	20 N	12.5 E
*Gila and Salt River Baseline and Meridian, Arizona Source: USGS 7.5-minute quadrangle maps (Chavez Mountain East, Chavez Mountain NE, Chavez Mountain NW, Chavez Mountain West, Kinnikinick Lake, Meteor Crater, Mormon Lake)			

2.2.1 Wind Park

A wind park consists of numerous WTGs and related energy generation and transmission infrastructure. The number and model of turbines are typically determined by one or more power sale contracts, the wind resource, and turbine availability and cost. The locations of WTGs are generally arranged in rows, spaced approximately one-quarter mile apart within rows, and approximately three-quarter mile apart between rows, known as arrays. Each of the WTGs generates electricity that is collected and transmitted to a new electrical step-up substation. Here, the voltage is converted for connection to the regional transmission system from which it can be made available for use or sale to the utility marketplace.

The proposed wind park study area is located entirely on private and State trust lands, not Forest Service-managed lands, currently used for ranching operations. The wind park study area is depicted on Figure 2.2-3. Figure 2.2-3 is a preliminary layout plan that depicts the planned infrastructure for the up to 500 MW project, as well as the preliminary layout plan for the project site area for the initial phase for up to

250 MW and the subsequent build-out phase project site area as discussed above. As noted in the above discussion of the Project site, to the extent that pre-construction surveys provide information that minor adjustments in infrastructure or turbine siting would avoid or further reduce the impacts identified in this Final EIS, adjustments that are feasible would be made.

The wind park would potentially generate up to 500 MW of electricity. It is anticipated that the wind park would be built in two or more phases. One or more power sale contracts would determine the wind park phases and the ultimate wind park size. Power sale contracts would determine size and the number of turbines per phase, timing of wind park phases, wind park layout and design, and related construction schedules.

The wind park would generate electricity from WTGs rated at 1.5 to 3.0 MW. For the purposes of this Final EIS, it is assumed, unless specifically noted, that a 1.8-MW WTG would be used (Figure 2.2-4). Using 1.5-, 1.8-, and 3.0-MW turbines as an example, if the wind park is fully built out to 500 MW, either 333 1.5-MW WTGs, or 277 1.8-MW, or 166 3.0-MW WTGs would be utilized.

The WTG model and size would be determined once final construction level wind analysis and project design are completed, and following one or more power purchase agreements. It is typical that, once selected, all of the WTGs would be the same model or have similar dimensions and be painted an industry-standard light gray or off-white.

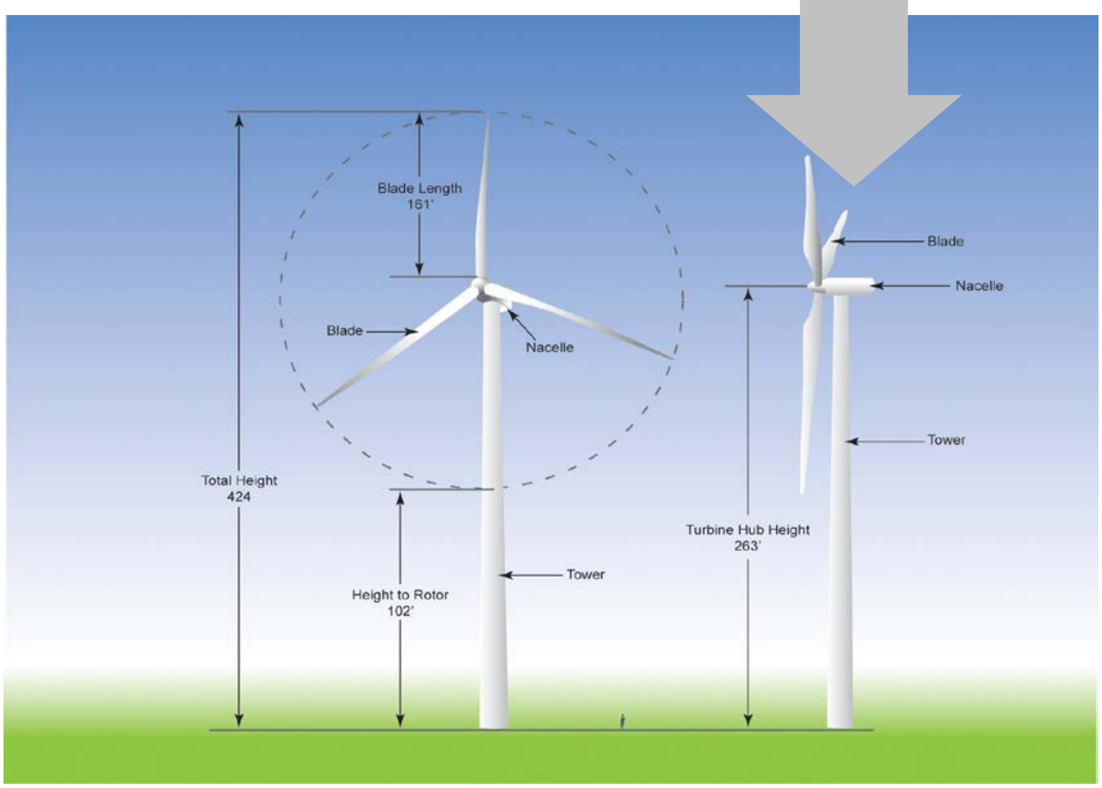
For purposes of this Final EIS, specifications for the Vestas V100 1.8-MW WTG are used to evaluate potential wind park impacts. This WTG is designed for high energy production for low wind sites and is suitable for northern Arizona's wind resource, altitude, and temperature range. This 1.8-MW WTG is a tubular steel tower, 263 feet in height and 14 feet in maximum diameter. Three blades, each 161 feet in length, extend from a nacelle located at the top of the tower. In addition, the nacelle houses the generator equipment. A pad-mount transformer could be situated near the base, or located within the nacelle, depending on WTG selection (see Figure 2.2-4 and Figure 2.2-5).

In addition to the WTGs, other permanent components of the wind park would include an electrical collection system, up to two step-up electrical substations, communications system, operations and maintenance building, access and service roads, and meteorological monitoring towers.

FIGURE 2.2-4
TYPICAL WIND TURBINE GENERATOR

The WTG would be secured to a concrete foundation. A pad-mount transformer would be situated near the base or located within the nacelle depending on WTG selection. The nacelle, mounted at the top of the tower, would house the electric generator and a gearbox. The WTG is expected to utilize a pad-mount voltage step-up transformer. Each WTG rotor would have three blades made of laminated glass and carbon fiber. The length of the blades would depend on the turbine model chosen, but Foresight anticipates that blades would be approximately 161 feet long. Overall WTG height after construction would be approximately 424 feet from the ground to the tip of the turbine blade when in the 12 o'clock position. The towers would be an industry-standard, neutral light-grey or off-white to blend into the natural environment. Dimensions are based on a typical 424-foot WTG; some turbines may be up to 500 feet in height.

FIGURE 2.2-5
WIND TURBINE GENERATOR DETAILS



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2.2.1.1 Engineering Surveys for the Wind Park

A pre-construction engineering site survey would be performed to stake out the exact location of the WTGs, service roads, electrical collection system, access entryways from public roads, step-up substation, operations and maintenance building, and other project features per project phase.

Geotechnical or geophysical investigations would be performed to identify subsurface soil conditions, rock types, and strength properties for the design work of the roads, foundations, underground trenching, and electrical grounding systems.

Geotechnical investigations would occur at each turbine foundation location. For a 1.8-MW WTG, it is typical to perform soil borings to a depth of up to 31 feet at turbine sites using a 3.25-inch hollow-stem auger. Representative soil samples from the borings would be retained for further laboratory testing to evaluate the design specification for each WTG foundation. Boring holes would be backfilled after each test.

In addition, soil resistivity and thermal conductivity tests could be performed at select turbine sites. Resistivity would be tested by inserting probes into the ground to measure the resistivity of the soil. In addition, eight-inch borings would be performed to a depth of five feet and retained for laboratory testing of the thermal conductivity characteristics of the soil.

A Worst Case Fresnel Zone Study would be conducted to determine the locations of licensed microwave paths to further aid in locating each WTG to avoid conflicts with licensed communication pathways.

2.2.1.2 Construction of the Wind Park

It is anticipated that the wind park would be constructed in two or more phases. An initial phase, capable of generating up to 250 MW, would be constructed over a 12- to 18-month period of time. One or more subsequent phases would follow, resulting in a fully built-out wind park capable of generating up to approximately 500 MW. The timing and size of each phase would be dependent on one or more power sale contracts.

The wind park study area substantially exceeds lands anticipated to be disturbed for the wind park components. The location and siting of wind park infrastructure would be determined, per phase, based on additional wind assessment, turbine model selection, and one or more power market agreements.

Approximately 250 to 400 workers could be on-site during peak construction for the initial and subsequent 250 MW project phases. Construction activities would be temporary and would involve the use of heavy equipment, including bulldozers, graders, trenching machines, concrete trucks, tractor-trailer trucks, and large cranes. Table 2.2-2 lists the estimated type, number, and duration at the wind park site for construction equipment needed during construction of the proposed wind park.

TABLE 2.2-2 ESTIMATED TYPE, NUMBER, AND DURATION OF PROJECT CONSTRUCTION EQUIPMENT FOR A TYPICAL 250 MW PHASE		
Construction Phase/Equipment	**Estimated Average Number of Vehicles On-site During Construction**	**Estimated Duration (months)**
Site Preparation and Road Construction		
Bulldozer	2–6	4–12
Road grader	1–3	4–12
Compactor	1–3	4–12
Backhoe	1–3	4–12
Foundations / Borrow Pit / Batch Plant, etc		
Backhoe	2–5	4–8
Crane (5-ton)	2–5	4–8
Forklift	4–12	4–8
Collection System		
Trenching machine	1–3	4–12
Reel carrier	1–3	4–12
WTG Assembly and Erection		
Crane (500-ton)	1–2	4–8
Crane (100-ton)	2–5	4–8
Substation/O&M Facility* Construction		
Bulldozer D-6	1–2	4–8
Backhoe	1–2	4–8
Grader	1–2	4–8
Crane (5-ton)	1–2	4–8
*May include the construction of a septic system and drilling a well. If a well is required, a drilling rig would be used.		

<u>Wind Park Mobilization, Staging, and Access</u>

The initial steps in the construction of the wind park would include: constructing or improving access roads; establishing borrow pits and setting up a rock crusher and batch plant; developing a temporary power and water source; and establishing a wind park staging area.

Temporary Water

Water would be required during each project phase for construction activities, including dust control and preparation of concrete. Water would be sourced from one or more privately owned wells located on private land within the wind park study area.

Approximately 30 to 50 million gallons of water would be required during the initial up to 250 MW phase of construction, with between 60 and 100 million gallons of total water required for full wind park build-out during construction.

Potable water would also be sourced on-site from a private landowner and would be available at the wind park staging area during construction. While not anticipated, potable water could be sourced from one or more commercial water haulers if necessary.

Temporary Power

There are currently no sources of electricity on-site. A temporary source of electricity would be required for construction. Two options are under consideration as described below.

1. On-site Generation: Either multiple 5-kW or a single 50-kW, diesel generator would provide electricity during the construction period. Fuel would be purchased locally, and fuel would be housed on-site in accordance with requirements for on-site fuel storage.
2. Electrical Distribution Line: A temporary distribution line would be extended from an existing distribution line located along Meteor Crater Road. This line would be located adjacent to the primary site access road within a 60-foot-wide right-of-way and would not require separate access. The overhead line would be strung on wooden poles approximately 25 to 30 feet tall and spaced approximately 150 feet apart. Construction of the line would occur over three to five months and would require between 15 and 30 workers at its peak. If necessary to construct, this distribution line would conform to Avian Power Line Interaction Committee (APLIC) recommendations to reduce potential impacts to wildlife (APLIC 1994, 2006).

Borrow Pits, Rock Crusher, and Batch Plant

Base material and aggregate required in the construction of the roads, staging areas, WTG foundations, transmission tie-line structure foundations, operations and maintenance building foundation, and the up to two step-up substations are expected to be sourced on-site from within the wind park study area. The use of on-site borrow pits would eliminate the need to bring in raw materials that would require a substantial number of heavy truck trips to and from the wind park study area during construction. The borrow pits would become operational prior to road construction activities and would remain in operation until construction of the wind park and transmission tie-line are completed.

One or more borrow pits would be located within the wind park study area on private land. Each of these would be approximately two to four acres in size and would provide aggregate that would be needed for wind park construction, as well as construction of the transmission tie-line. The locations of these borrow pits have not been determined, but would be subject to geological analysis. If it is determined that aggregate material from these borrow pits would be used on Forest Service-managed lands, the sites would be surveyed for noxious weeds and material colors would match the existing landscape where they would be utilized.

Breaking or blasting to fracture and loosen the limestone base could be required at each borrow pit. Blasting activities would be conducted by professionally trained and certified explosives experts and would employ industry-standard techniques.

Quarried materials would be transported to a portable rock crusher located at each pit. The rock crusher would process the raw materials into aggregate for base construction material and concrete. The rock crusher would operate during the construction periods for the wind park and transmission tie-line. Each crusher would be located in an area approximately two acres in size and typically surrounded by a one-foot high earth berm to contain water runoff. A portable source air quality permit would be required for operation of each rock crusher.

One or more portable concrete batch plants (Figure 2.2-6) would be located within the wind park study area on private and/or State trust land. The location of each batch plant site would be determined during construction planning. Each batch plant would require an area approximately two acres in size, including an area for the batch plant and stockpiling of materials such as sand, cement, and water. Batch plants would be used to mix concrete for use in the WTG foundations, transmission tie-line structure foundations, and other facilities that would require the use of concrete. At least one batch plant would be in operation throughout the construction period of the wind park and transmission tie-line. Each batch plant would require a portable source air quality permit.

Batch plants and rock crushers would be powered by portable electric generators, and fuel would be stored on-site in accordance with requirements for on-site fuel storage.

FIGURE 2.2-6
TYPICAL PORTABLE BATCH PLANT

Source: http://www.cemcoinc.comproducts.php

Staging Areas for the Wind Park

Staging areas are typical of construction and are multi-purpose areas used to store and assemble materials. A temporary wind park staging area would be developed on approximately 8 to 12 acres within the wind park study area per project phase. The location of the wind park staging area would be determined upon final wind park design and layout. The wind park staging area would be used for construction safety meetings, to host office trailers, temporary sanitation stations, parking for equipment, vehicle parking for equipment operators and construction workers, and staging for limited wind park components.

An additional on-site temporary staging area would be used during access road construction for equipment and employee parking. The staging area would be approximately four to six acres in size and may or may not be located in the same place as the larger staging area described above, but would be located with the wind park study area on private land.

Staging areas would be prepared by clearing and grading as needed. The areas would then be covered with four to six inches of gravel to provide a level ground surface. The gravel would be sourced from borrow pits on-site. Excess spoil material and topsoil salvaged from the site would be used for top-fill in other construction areas.

Temporary security fencing could be located around construction staging areas. If utilized, fencing would be a six-foot-high chain link structure with additional security wiring located at the top. When construction is complete, the fencing around the staging areas would be removed.

Temporary staging areas would be reclaimed once construction is complete. The initial wind park staging area would be kept, but reduced in size to accommodate permanent parking and other uses near operations and maintenance facilities. Excess gravel would be removed and salvaged for resale to other construction projects in accordance with landowner requirements.

Wind Park Primary Access and Service Roads

Construction and improvement of the new and existing primary access and service roads would occur over a period of four to six months and would require between 50 and 100 workers at its peak. The primary site access road would be constructed for the initial Project phase.

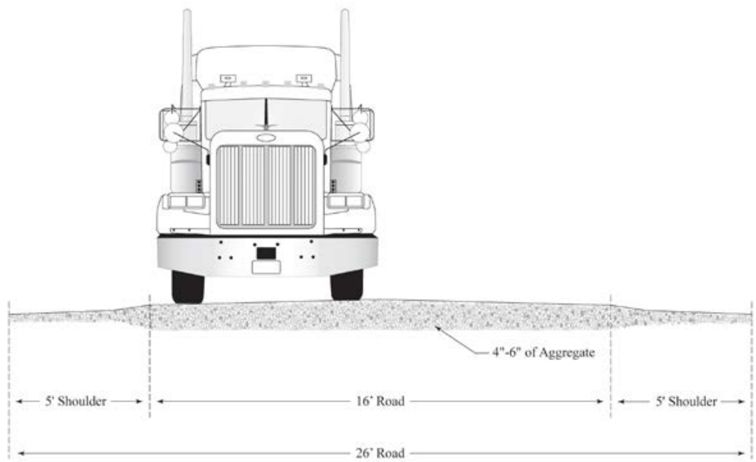
Primary access and service roads would be improved or designed and constructed to State and Federal Water Quality Certification Standards for Linear Transportation Projects. The roads would be constructed using typical road construction equipment, including a bulldozer, grader, front-end loader, excavator, and a small crane. The roads would be cleared of vegetation and excavated to a depth of up to 12 inches and covered with approximately 4 to 6 inches of aggregate. The road surface would then be graded and compacted. Berms and other drainage features would be constructed as required. Topsoil removed during road construction would be used for top fill or stockpiled for berms and other drainage features.

Trucks and other vehicles would access the wind park study area from Interstate-40 (I-40) at the Meteor Crater Road exit. In order to accommodate construction traffic, additional gravel could be placed on already disturbed roadway shoulders at the intersection of I-40 and Meteor Crater Road. No off-site improvements have been identified at this time. If off-site transportation roadway improvements are in the future, after the completion of the Final EIS, any environmental impacts associated with these modifications would be addressed in accordance with regulatory requirements.

The primary site access road would originate from Meteor Crater Road and would extend to the west across Canyon Diablo and then south into the wind park study area. The access road would be constructed as a new all-weather, compacted gravel road approximately eight miles in length. The road would generally be 16 feet wide, with a 5-foot shoulder on either side (Figure 2.2-7).

The primary access road would require a crossing of Canyon Diablo. This crossing is expected to occur at one of three suitable locations that have been identified based on a preliminary evaluation (Figure 2.2-8). The final crossing location, structure, and design would be determined based on engineering and analysis completed during the design of the wind park. It is anticipated the crossing would require a bridge-type structure with a span of up to 80 feet and a roadway width of approximately 16 to 18 feet. The crossing would be designed to maintain stream flows and prevent erosion. In addition to Canyon Diablo, the road is expected to cross up to five smaller ephemeral washes. Culverts would likely be placed within these washes at crossings. Up to 75 feet on either side of the road would be disturbed where culverts or other drainage structures are located. Design and construction of the roads and crossing would be in accordance with the RPMs and Section 404 permit for the initial phase and subsequent phase(s) and compliance with County and other applicable road and crossing standards. These permits would be obtained pre-construction and based on final engineering design for the initial and subsequent phases.

FIGURE 2.2-7
CROSS-SECTION ILLUSTRATION OF TYPICAL PRIMARY SITE ACCESS ROAD



In addition to the primary access road, Chavez Pass Road, an existing road located between Meteor Crater Road to the north and State Route 87 to the south, could also be used for site access for subsequent wind park phases. Chavez Pass Road is maintained by the County and it is anticipated the road would not need to be recontoured or be upgraded outside of the existing roadway. If used, minor grading could be necessary and new surface material added, but no improvements are anticipated to be made outside of the current road area.

Once primary access has been established, service roads to each WTG site and other wind park facilities would be constructed. Up to approximately 143 miles of service roads would be needed if the wind park is fully built out to 500 MW. All service roads would be located within the wind park study area on private and/or State trust land. Service roads would be sited to minimize disturbance and maximize transportation efficiency. Existing roads, ranch roads, and two-track trails would be used to the extent possible. Service roads would be constructed to the same specifications and standards as the primary site access road with the exception of an additional five feet on either side resulting in a ten-foot shoulder (Figure 2.2-9). This additional width is necessary to facilitate the movement of a large crane from one WTG to the next. Following construction, this additional shoulder width would be reclaimed.

The wind park perimeter would not be fenced, and access to public land would not be gated. Primary access to the wind project on private land and trust lands administered by ASLD would be via a newly constructed access road for which the ASLD anticipates issuing a non-exclusive right-of-way for the Project, grazing lessees, and private landowners. Access to certain portions of the wind park on Federal, State, and private land could be restricted for public safety and project security.

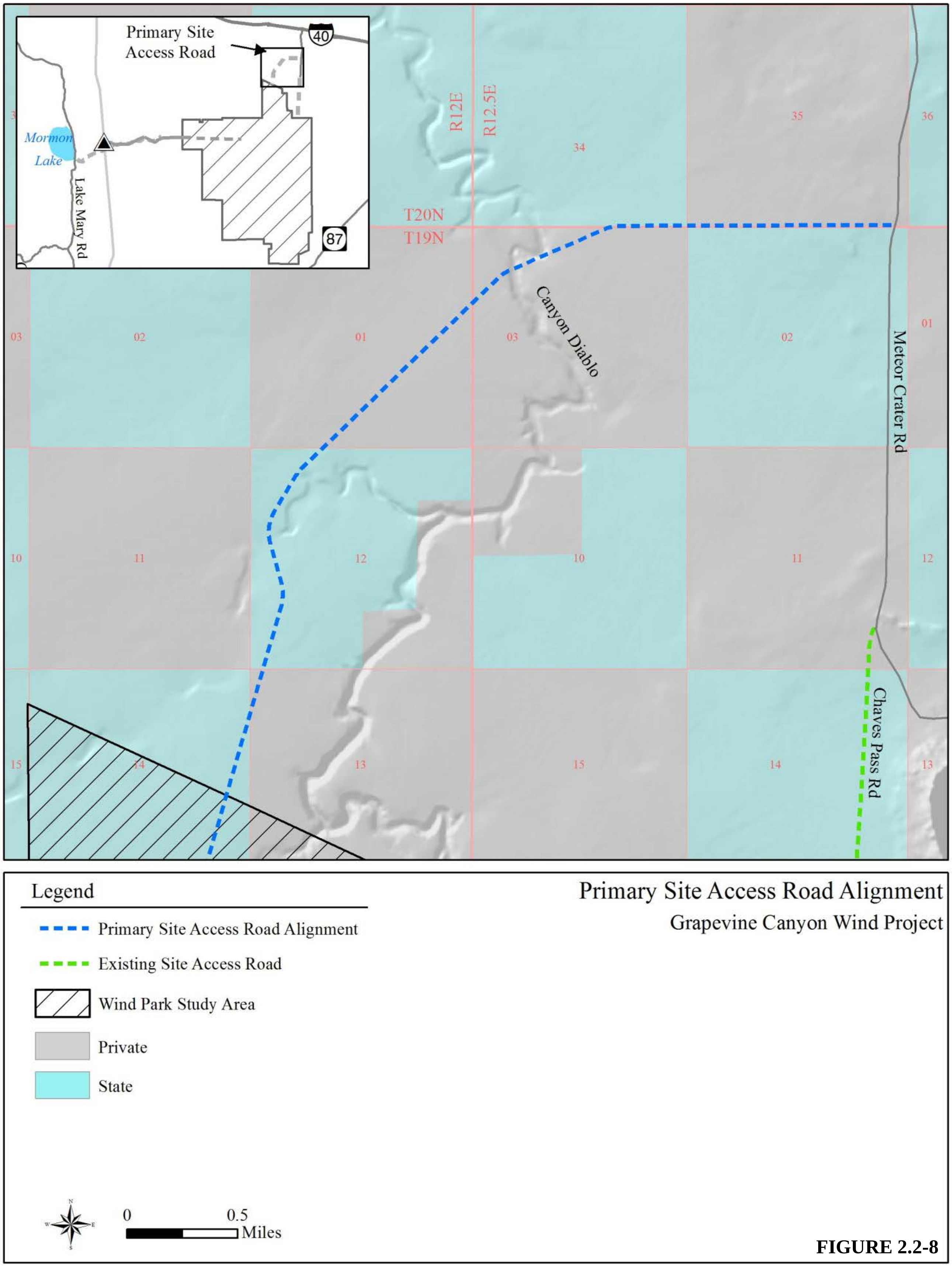
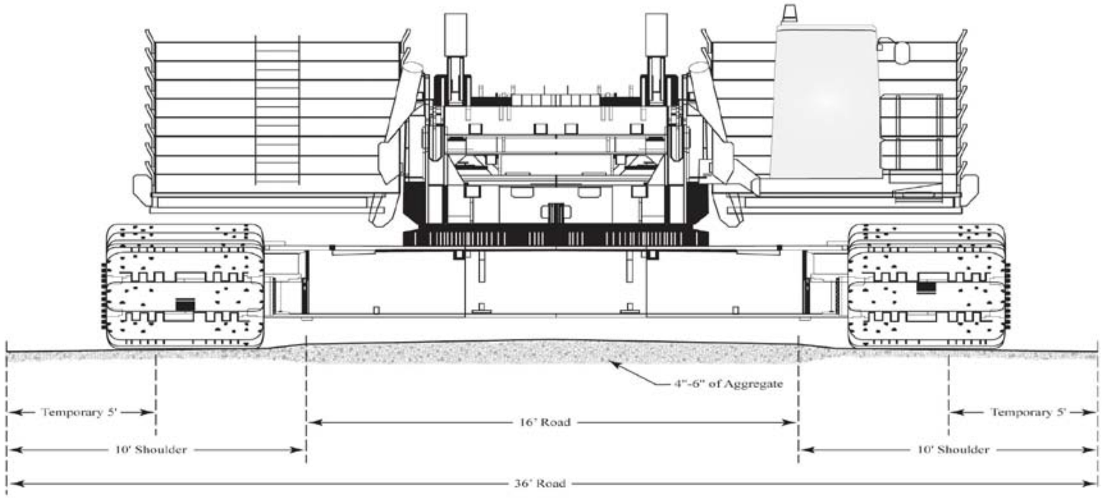

Primary Site
Access Road
40
Mormon
Lake
Lake Mary Rd
87
R12E
R12.5E
35
36
34
T20N
T19N
Canyon Diablo
03
02
01
03
02
01
Meteor Crater Rd
10
11
12
10
11
12
15
14
13
15
14
13
Chaves Pass Rd
Legend
Primary Site Access Road Alignment
Existing Site Access Road
Wind Park Study Area
Private
State
Primary Site Access Road Alignment
Grapevine Canyon Wind Project
0
0.5
Miles

FIGURE 2.2-8

FIGURE 2.2-9
ILLUSTRATION OF TYPICAL SERVICE ROAD TO ACCOMMODATE LARGE CRANE



Construction of Wind Turbine Generators

The typical construction sequence of the WTGs is depicted in Figure 2.2-10 and described below.

FIGURE 2.2-10
TYPICAL WTG CONSTRUCTION STAGES

An area approximately 2.2 acres in size at each WTG location would be cleared with a grader and excavated with a backhoe to prepare for each concrete foundation and to accommodate the WTG, temporary work areas, and a crane pad. The crane pad would be an approximate 50-foot by 50-foot compacted and graveled area adjacent to each WTG and would remain after construction.

Each turbine and pad transformer, if required, would require foundations. The most likely foundation design for the Vestas V100 WTG is a spread footing with an octagonal base. Each foundation would consist of approximately 25 to 40 tons of steel and approximately 350 to 400 cubic yards of concrete per WTG. The excavated area would be approximately 10 to 15 feet deep and 45 to 60 feet in diameter. A 16-foot-diameter pedestal would be centered within the foundation footprint with approximately 1 foot of the foundation protruding above grade. Excess excavated material, including topsoil, would either be stockpiled for backfill and reclamation, or disposed of in accordance with applicable regulations and permit conditions.

Each WTG would be assembled and erected by cranes in multiple stages. A 400-ton crane would likely be used similar to the model illustrated in Figure 2.2-10. The crane would arrive to the wind park in sections and be assembled on-site.

The components of each WTG would arrive via semi-trailers. If one crane is utilized at the site, 10 to 13 semi-trailer loads of wind facility components would be transported and offloaded at the project site per equipment delivery day; if two cranes are utilized at the site, 20 to 26 trailer loads would be transported and offloaded per equipment delivery day.

WTG assembly would involve connecting the anchor bolts to the concrete foundation, erecting the four-section tower, erecting the nacelle, assembling and erecting the rotor, connecting the internal cables, and inspecting and testing the electrical system prior to operation.

The blades would be assembled into a rotor assembly on the ground prior to placement on the nacelle. The rotor assembly consists of connecting the three blades to the hub. The hub is the central element that connects the blades to the shaft of the gearbox. The hub would be placed on a special stand that elevates it approximately eight feet above grade. The blades would then be individually attached to the hub, and then raised into place by the crane and attached to the nacelle.

Construction of Electrical Collection System

Construction of the collection system would last approximately 10 to 14 months and would occur prior to or concurrent with WTG construction. Approximately 15 to 30 workers would be on-site during peak construction.

To the extent possible, the collection system would be located adjacent to the WTG service roads to minimize disturbance. Approximately 241 miles of 34.5-kV collection lines would be needed if the wind park is fully built out to 500 MW. The collection system would be located within the wind park study area on private and/or State trust land, and the majority of the collection system would be underground. However, if a combination of underground and overhead collection system is utilized, the length of underground collection system would be proportionally reduced by the length of overhead collection line. Each collector line would consist of three cables: an electrical conductor, a solid copper (unshielded) ground wire, and a fiber optic line.

The underground collection lines would be constructed by excavating trenches to a minimum depth of four feet, depending on the underlying soil and rock conditions, and to a width of one to two feet. The three cables would then be placed in the trench, and the trench would be backfilled with a warning tape placed 12 to 18 inches above the cabling.

Temporary disturbance resulting from the construction of the underground collection system would include tracks from the trenching equipment and a three- to five-foot swath of disturbed soil as a result of excavating and backfilling the trench. All surface disturbances would be limited to a 25-foot-wide construction corridor, inclusive of temporary construction disturbance and any collection line service roads.

If utilized, the overhead collection lines would be supported by wooden poles approximately 25 to 30 feet tall and spaced approximately 150 feet apart. The lines would be constructed in two phases, using typical construction techniques. First the pole structures would be set using a single multi-purpose truck. The truck would include a small crane suitable for lifting and placing poles. A pole trailer would be towed behind the crane truck to transport the poles to the installation site. Affixed to the crane would be an auger for boring the holes for the pole structures. Soil excavated during construction would be used for backfill and for restoration of disturbed areas. Second, cable would be installed using a cable truck and a truck with a person lift. The cable would be strung out along the installation route and the man lift would be used to place the cable on the pole structure.

Temporary construction and permanent service access to the line would be primarily provided by the WTG service roads. In areas where overhead collection cannot be collocated with the WTG service roads, surface disturbance would be limited to a 25-foot-wide construction corridor.

Construction of Communications System

The communication system for the wind park includes a series of fiber optic cables connecting the WTGs. The fiber optic cable would connect each WTG to the step-up substations. The fiber optic cables would terminate at a switchgear enclosure located within the proposed step-up substations. Data could be transmitted via an on-site microwave tower or via a fiber optic cable included on the transmission tie-line to the switchyard. The fiber optic cables would be installed at the same time as the electrical collection system, either within the same trench or attached to the same overhead structures.

Construction of the Step-Up Substations

Two step-up substations, for initial and build-out phases, would be located within the wind park study area on private and/or State trust land (Figure 2.2-3). Each substation would be sited on an approximately four-acre parcel with an additional two acres disturbed during construction activities (see Table 2.2-4). An extension tie-line approximately seven miles in length, ranging between 138-kV and 230-kV, would connect the two step-up substations. Pole structures for the extension tie-line would be 100 to 180 feet in height. Construction would involve site grading, installing gravel material within the fenced area of the substation, constructing concrete foundations for the transformers and other components within the substation, installing substation equipment, and erecting a chain-link security fence around the substation perimeter. Figure 2.2-11 includes a picture of a typical step-up substation. A bulldozer, backhoe, grader, crane, and general purpose trucks would be used in the construction of the substation. It is expected that each substation would be constructed over a four- to eight-month period, and 15 to 25 workers would be on-site during peak construction.

Construction of the Operations and Maintenance Building

The O&M facility would be located within the wind park study area on private and/or State trust land on an approximately 2.4-acre parcel, typically co-located with the wind park construction staging area. Drainage features would be constructed, if needed. Construction of the O&M facility would include foundation preparation and pouring, framing the structure and roof trusses, installing the outer siding, installing plumbing and electrical work, and finishing the interior carpentry. The facility would typically require a septic system and potentially a well. Once complete, the O&M facility would have the appearance of a typical prefabricated steel building.

Equipment required for construction of the O&M facility would include a bulldozer, road grader, compactor, backhoe, concrete mixer, crane, and general purpose truck. Construction of the O&M facility would be accomplished in approximately four to six months with approximately 15 to 30 workers on-site during peak construction.

FIGURE 2.2-11
TYPICAL STEP-UP SUBSTATION

FIGURE 2.2-12
TYPICAL LONG-TERM MET TOWER

Meteorological Towers

Several temporary meteorological (met) towers have been constructed over the past several years within the wind park study area on private and State trust land to gather wind data indicating the feasibility of the wind park. These existing towers would remain in place until construction of the wind park is complete. In addition, up to five additional temporary met towers could be installed prior to construction to further analyze the wind resource across the wind park study area. Temporary towers would be decommissioned and removed during the construction process for wind park phases.

Up to 16 long-term or permanent met towers would be used to monitor wind conditions at the site if the wind park is built out to 500 MW. These met towers would be free-standing structures, approximately 263 feet tall, constructed of steel lattice. A typical long-term met tower is depicted in Figure 2.2-12. Construction equipment needed for the installation of the met towers would include a bulldozer, road grader, and compactor for site preparation; a backhoe and concrete mix truck for the foundation; and a crane and general purpose truck for erection of the towers. Approximately six to nine workers would be on-site during construction of each of the permanent met towers over approximately two weeks per tower.

Security During Wind Park Construction

The wind park owner or manager would develop and implement a security plan to effectively monitor the wind park activities during construction. A security plan would be developed and adapted throughout the course of construction to address the level of construction activity and the type of equipment being used. Construction lighting would be in conformance with the Coconino County Lighting Ordinance.

Construction materials would be stored at individual WTG locations or at the staging areas. Temporary fencing with a locked gate could be installed around a roughly 1.5-acre area adjacent to the O&M facility for temporary storage of any special equipment or materials.

2.2.1.3 Operation and Maintenance of the Wind Park

Wind Park Start-Up

Plant commissioning would follow mechanical completion of the wind park, transmission tie-line, and switchyard and would begin with a detailed plan for testing and energizing the electrical collection system, step-up substations, transmission tie-line, and interconnection switchyard in a defined sequence with lock and tags on breakers to ensure safety and allow for fault detection prior to energizing any component of the system. Once the step-up substation is energized, feeder lines would be brought online, one by one. Individual turbines would then be tested extensively then brought online, one by one. Commissioning does not require any heavy machinery to complete.

Wind Park Operating Requirements and Staffing

Operating Schedule

The wind park would be in operation 24 hours per day, 365 days per year. The wind park would be staffed as necessary to provide operational maintenance and environmental compliance support. The wind park's central Supervisory Control and Data Acquisition (SCADA) system would stay online fulltime, 24 hours per day, 365 days per year.

Operation and Maintenance Staff

The wind park would be operated and maintained by a team of approximately 17 to 40 personnel if fully built out for a typical 500 MW project, consisting of the following staff positions (Table 2.2-3):

TABLE 2.2-3
TYPICAL WIND PARK OPERATION AND MAINTENANCE STAFFING
(BASED ON UP TO 500 MW WIND PARK)

Position	**Number of Personnel***
O&M Project Manager	1
Administrative Assistant	1
I&E Technician	1–2
Lead Wind Turbine Technician	1–3
WTG Technicians (Technician 1, Technician 2)	12–32
Misc services (security, housekeeping, general maintenance)	up to 0.5

*dependent upon on quantity and type of turbine selection

Fencing and Security

The wind park perimeter would not be fenced. Public access across wind park service roads that connect to wind park infrastructure would be based on consultation with the private and State landowners. Service roads that do not access public lands could be gated. A lockable steel door at the base of each WTG would restrict access to authorized personnel only. If the selected WTG requires a pad-mount transformer, these would be locked. Consistent with industry standard practices, WTGs and pad-mount transformers would not be fenced.

The step-up substations would be fenced and gated to industry standards for electric utility infrastructure. The area would be secured and limited to authorized personnel.

Wind Park Power

During the operating life of the wind park, electricity for the O&M facility would be needed. Once Western's interconnection switchyard, and the wind park's transmission tie-line, and up to two step-up substations are complete and energized, station power to the wind park facilities would be fed via a dedicated circuit from the step-up substations. From here, power would be delivered to the O&M building.

Operation of the Step-up Substations

The step-up substations would be equipped with night-time and motion sensor lighting systems, as well as emergency lighting with back-up power. Lighting fixtures would be in conformance with the Coconino County lighting ordinance.

Operation of the Communication System

Each turbine would be connected to the SCADA system. The SCADA system would allow for remote control and monitoring of individual turbines and the wind park as a whole from both the central host computer or from a remote computer. The SCADA equipment would be located in the control panel housed inside the base of each WTG. The SCADA system would allow the operator to remotely control and monitor project performance via an internet connection or dedicated high-speed phone line on a continuous basis. Any abnormalities or emergencies detected by the system would initiate a callout sequence, and a maintenance person would be alerted and, if required, dispatched to the WTG immediately to implement corrective action.

Operation of the WTGs

The WTGs would be equipped with sophisticated computer control systems to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch and yaw angles, etc. The main functions of the control system would include nacelle and power operations. Heat dissipation for the operating machinery inside the wind turbines, such as the generator and gearbox, would be achieved with air cooling. Heat dissipation is very minimal.

Aerodynamic brakes and mechanical disk brakes are security measures installed in each WTG. The braking system is designed to be fail-safe, allowing the rotor to shut down during high wind conditions or in less than five seconds in case of electric power failure. Emergency stops are located in the nacelle and in the bottom of the tower. Turbines are also designed to allow for disconnection from all power sources during inspection and maintenance.

Typical chemicals used during operation and maintenance of WTGs include anti-freeze liquid to prevent freezing, gear oil for lubricating the gearbox, hydraulic oil to pitch the blades and operate the brake, grease to lubricate bearings, and various cleaning agents and chemicals for maintenance of the turbine.

Turbines are certified to ISO 14001:20004 for environmental system compliance. All chemicals would be stored and handled in accordance with applicable laws and regulations throughout the construction and operating periods of the wind park.

WTGs would be lighted according to Federal Aviation Administration (FAA) requirements. The FAA has an administrative procedure that provides a Determination of No Hazard with permits for each WTG tower over 200 feet in height. The FAA would provide an approved lighting plan for perimeter WTGs and select internal WTGs for the final project layout, per phase, prior to construction. Typically the FAA requires that approximately one-third of all WTGs in a wind park are lighted. Industry standard lighting is a medium intensity red synchronized flashing light-emitting diode (LED) obstruction light with a horizontal beam pattern.

<u>Operations and Maintenance Building</u>

The O&M facility would include a main building with offices, spare parts storage, restrooms, a shop area, outdoor parking facilities, a turn-around area for larger vehicles, and outdoor lighting. The O&M facility is expected to be fenced. The building would be secured with locking access and service doors, with access limited to authorized personnel. Public access to WTG service roads that connect to the O&M facility would be based on consultation with the private and State landowners.

During operations and maintenance, water to the O&M facility would be expected to be piped from a private on-site well and stored in on-site storage tanks. Domestic sewage would be discharged and treated in an on-site closed septic system. The septic system would be a leach field design, typical to the region and permitted through Coconino County.

Heating for the facility would be determined at the final design stage; electricity, propane or natural gas would be evaluated. If propane or natural gas is selected, storage of this fuel would be addressed in the Spill Prevention, Control, and Countermeasures (SPCC) Plan and other approvals and permitting required for construction, operations, and maintenance of the facility.

Facility exterior lighting would be in conformance with the Coconino County Lighting Ordinance.

<u>Operation of the Meteorological Towers</u>

The wind park design would include up to 16 permanent met towers (for a 500 MW wind park) fitted with multiple sensors to track and monitor wind speed and direction and temperatures. The permanent towers would be connected to the plant's central SCADA system.

These met towers would be lighted according to FAA requirements. Similar to the WTGs, the FAA has an administrative procedure that provides a Determination of No Hazard with permits for each met tower over 200 feet in height. The wind park owner or manager would meet the FAA requirements for lighting.

2.2.1.4 Summary of Wind Park and Ground Disturbance and Reclamation Activities

Table 2.2-4 provides estimates of the extent of temporary and permanent ground disturbance associated with construction, operation, and maintenance of the proposed wind park.

TABLE 2.2-4 ESTIMATED PERMANENT AND TEMPORARY GROUND DISTURBANCE ASSOCIATED WITH A 500 MW WIND PARK						
Facility	**Temporary Ground Disturbance (acres)**			**Permanent Ground Disturbance (acres)**		
	1.5 MW WTG	**1.8 MW WTG**	**3.0 MW WTG**	**1.5 MW WTG**	**1.8 MW WTG**	**3.0 MW WTG**
Project staging/parking area	28–40			24–36		
Borrow pits (to be determined)	2–4			2–4		
Batch plants (2)	0.2			0.2		
Electrical distribution line	61–86			61–86		
Step-up substations (2)	11			7		
O&M building/parking area	2.1			2.1		
Primary access roads	41	35	44	25	22	27
Internal access roads	592	628	382	427	454	276
Wind turbine generators	665–786	553–654	332–392	51	42	25
Collection system/ communication system	712	730	608	0*	0*	0*
Long-term meteorological towers (12)	0.3			0.3		
TOTAL	2,111–2,272	2,047–2,190	1,465–1,567	535–550	552–567	360–375

Source: Foresight Renewables 2011

*Some permanent disturbance is likely in areas where an overhead collection system is constructed. Permanent disturbance would include the foundation and footprint of each structure and would amount to less than one acre total.

Note: Temporary and permanent ground disturbance is not exclusive (i.e., permanent ground disturbance is the same as or part of temporary disturbance).

<u>Reclamation of Disturbed Areas</u>

Following construction, areas not maintained as permanent facilities would be returned to a condition reasonably similar to their pre-construction state. This would include replacing topsoil of the same or similar type and reseeding the affected areas with plant species native to the region. Post-construction re-contouring is not anticipated since excavation activities would be conducted to retain natural contours where feasible.

After construction has been completed, the graveled wind park staging area would be reduced to accommodate permanent parking and other uses near the O&M facility or step-up substations. Excess gravel would be removed and salvaged for resale to other construction projects, or according to landowner desires. The area would be graded and reclaimed as described above.

Resource protection measures are included in Table 2.7-1 to address reclamation of disturbed areas.

2.2.1.5 Wind Park Decommissioning

The design life of major wind park equipment such as the turbines, transformers, substations, and supporting infrastructure is typically considered to be at least 25 years. It is likely that after mechanical wear takes its toll, the wind facilities could be upgraded with more efficient equipment and could have a useful life longer than 25 years. Such upgrades could require additional Federal, State, and local review and approval.

Once it is determined that the wind park would be decommissioned, financial and decommissioning responsibility would rest with the owner or operator of the wind park. Decommissioning provisions are a typical term in land rights agreements and are expected to be required in jurisdictional permits from the Forest Service (special use permit), ASLD (right-of-way easement), and Coconino County (conditional use permit). Decommissioning provisions include stipulations for post-construction and non-compliance. Foresight also has decommissioning and post-construction reclamation provisions in the land lease agreement with the private landowner that would be implemented per the executed lease per Project phase.

2.2.2 Transmission and Extension Tie-lines

The electricity generated by the wind park would be gathered at the step-up substations located within the wind park study area on private and/or State trust land, where the voltage would be transformed from 34.5 kV to 345 kV. A new 345-kV single-circuit electrical transmission tie-line would be constructed between the wind park step-up substations and Western's existing Glen Canyon-Pinnacle Peak No. 1 and No. 2 345-kV transmission lines. The proposed transmission tie-line would be located on private, State trust, and Forest Service-managed lands.

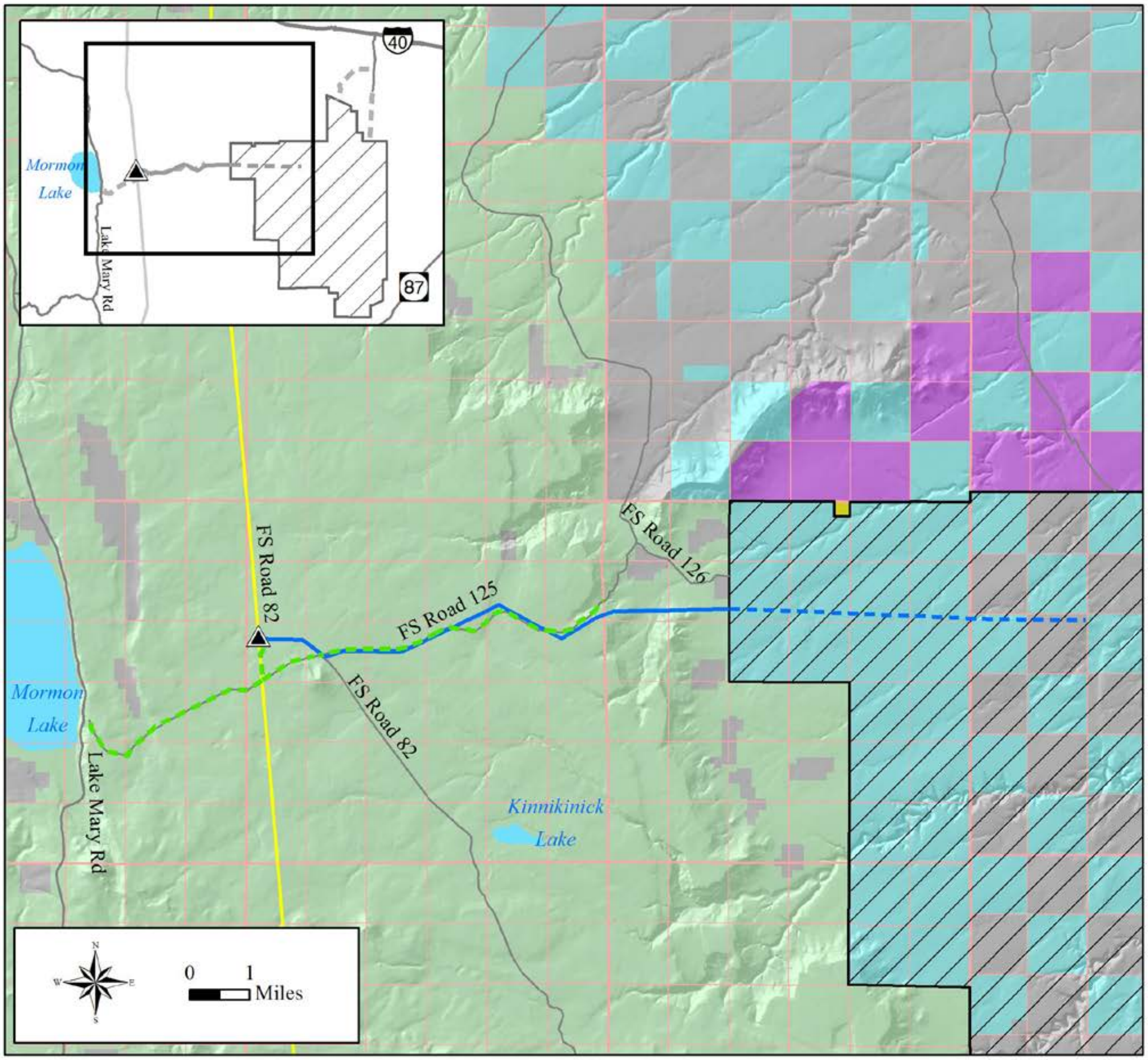
The Glen Canyon-Pinnacle Peak 345-kV transmission lines are part of the regional electrical grid. Connecting into this existing electrical transmission system would allow electricity produced at the wind park to be sold and utilized by Arizona and regional utilities.

The transmission tie-line includes monopole structures, conductors, and associated access roads. The transmission tie-line would be up to approximately 15 miles in length, extending 8.5 miles across Forest Service-managed lands and up to approximately 6.5 miles across State trust and private lands. A 200-foot-wide right-of-way would be acquired for construction, operation, and maintenance of the transmission tie-line for the sections that cross the Forest. General design characteristics of the proposed transmission tie-line are provided in Table 2.2-5 and a location map is provided as Figure 2.2-13. Gray steel monopole structures with non-reflective finishes would be utilized (Figure 2.2-14 is indicative of a typical transmission tie-line structure).

TABLE 2.2-5
TYPICAL 345-kV STRUCTURE CHARACTERISTICS

Feature	Description
Length	Up to approximately 15 miles
Structure height	Approximately 120 feet
Structure diameter	Approximately 7-8 feet
Span length	Approximately 1,000 feet
Right-of-way width	200 feet
Number of structures on Forest Service-managed lands	Approximately 45
Number of structures on State trust or private lands	Up to approximately 35

An extension tie-line approximately seven miles in length ranging between 138-kV and 230-kV would connect the two step-up substations within the wind park (see Figure 2.2-3). Pole structures for the extension tie-line would be 100 to 180 feet in height.



Legend

- Wind Park Study Area
- Proposed 345-kV Tie-line Alignment
- Proposed 345-kV Tie-line Alignment (Alignment to Be Determined)
- Proposed Interconnection Switchyard
- Existing Site Access Road
- Existing Western 345-kV Transmission Lines
- Bureau of Land Management
- Forest Service
- Arizona Game and Fish Department
- Private
- State Trust

Applicant's Proposed 345-kV Tie-line and Western's Proposed Interconnection Switchyard

Grapevine Canyon Wind Project

FIGURE 2.2-13

FIGURE 2.2-14
TYPICAL SINGLE-CIRCUIT 345-kV POLE STRUCTURE

2.2.2.1 Engineering Surveys for the Transmission and Extension Tie-lines

Pre-construction engineering surveys would be conducted to locate the transmission and extension tie-lines rights-of-way, identify property boundaries, provide accurate ground profiles along the transmission and extension tie-line centerlines, locate existing structures, and to determine the locations and rough ground profiles for new service roads. This information would also be utilized to determine the legal descriptions of properties to be used for the transmission tie-line. Soils would be tested to determine physical properties, including the ability to support the proposed structures. A portion of the proposed transmission tie-line would follow an existing cattle trail west out of the proposed wind park to minimize new land disturbance. Affected landowners and land managers would continue to be consulted during the initial route selection and structure siting process to reduce impacts to land uses and avoid or minimize disturbance to sensitive environmental areas.

2.2.2.2 Construction of Transmission and Extension Tie-lines

The construction of the 345-kV transmission tie-line and the extension tie-line would involve many steps, detailed below. Approximately 10 to 30 workers would construct the line over a period of six to ten months. Construction could be paced to accommodate seasonal conditions and to minimize impacts to wildlife.

<u>Tie-line Mobilization and Staging</u>

Three staging areas are planned for the construction of the transmission tie-line, one would be located near the switchyard (on Forest Service-managed lands) and one would be located within the wind park study area near the step-up substation (on private/State trust land). The staging area near the step-up substation would also be used for the extension tie-line. The third staging area would be located at a central point along the transmission tie-line route (on Forest Service-managed lands). Each staging area would be approximately four to six acres in size, located adjacent to the tie-line route. The staging area located near the switchyard could be co-located with the switchyard construction staging area, depending on construction sequencing.

The staging areas would be used for construction safety meetings, to host office trailers, temporary sanitation stations, parking for equipment, vehicle parking for equipment operators and construction workers, and staging for limited project components.

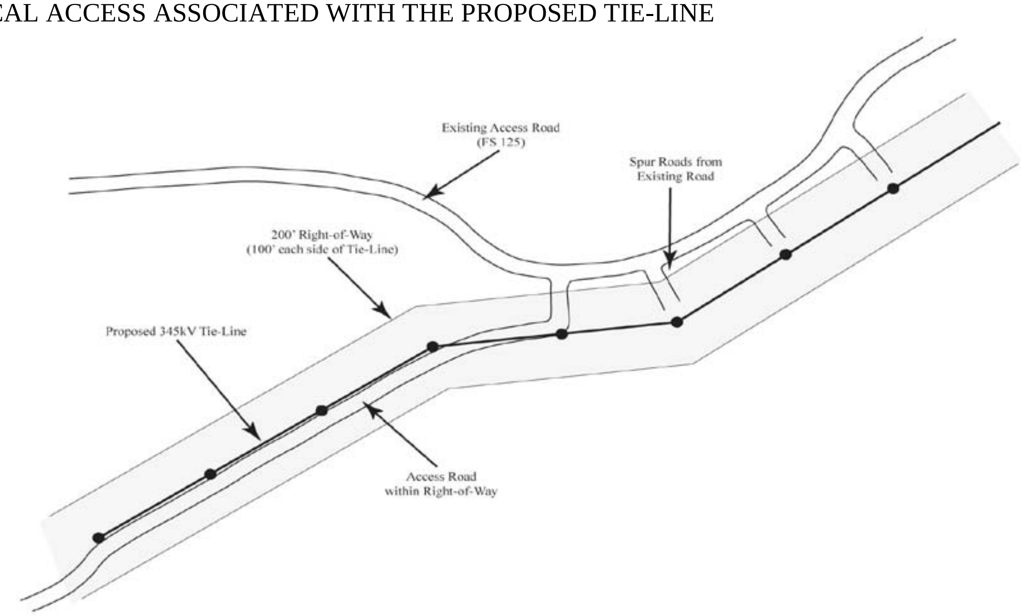
The staging areas would be prepared by clearing and grading as needed. The area would then be covered with four to six inches of gravel to provide a level ground surface. The gravel would be obtained from borrow pits within the wind park study area located on private and/or State trust land. Excess soil material and topsoil salvaged from the site would be used for reclamation of the area after construction or for top-fill in other construction areas. Water or other approved dust suppressant would be used during the grading of the staging area.

<u>Construction of Tie-line Access Roads</u>

Primary construction and maintenance access to the transmission tie-line would be from either Lake Mary Road to Forest Service Route 125 (FS 125) or from the wind park through the primary site access road. Construction access to the extension tie-line would be from the primary site access road. Access to each structure location would be required. In order to minimize ground disturbance, existing roads would be used when possible, with new spur roads constructed to the structure sites. When existing roads are distant from the transmission tie-line, a new access road or spur-road would be established adjacent to the transmission tie-line within the right-of-way. Figure 2.2-15 depicts typical parallel and spur roads access for transmission tie-line construction and maintenance.

The number and location of spur roads and newly constructed access roads would be determined at the time of final transmission tie-line design. Access and spur roads would not be maintained, but would be used regularly to access the transmission tie-line for routine inspections over the lifetime of the project. Typically, the roads would be between 12 and 16 feet in width with a surface that is bladed, compacted, and lightly graveled. Gravel would be sourced from a site approved by the Forest Service, inspected for noxious weeds, and of a color that would match existing roadways and landscapes.

FIGURE 2.2-15
TYPICAL ACCESS ASSOCIATED WITH THE PROPOSED TIE-LINE



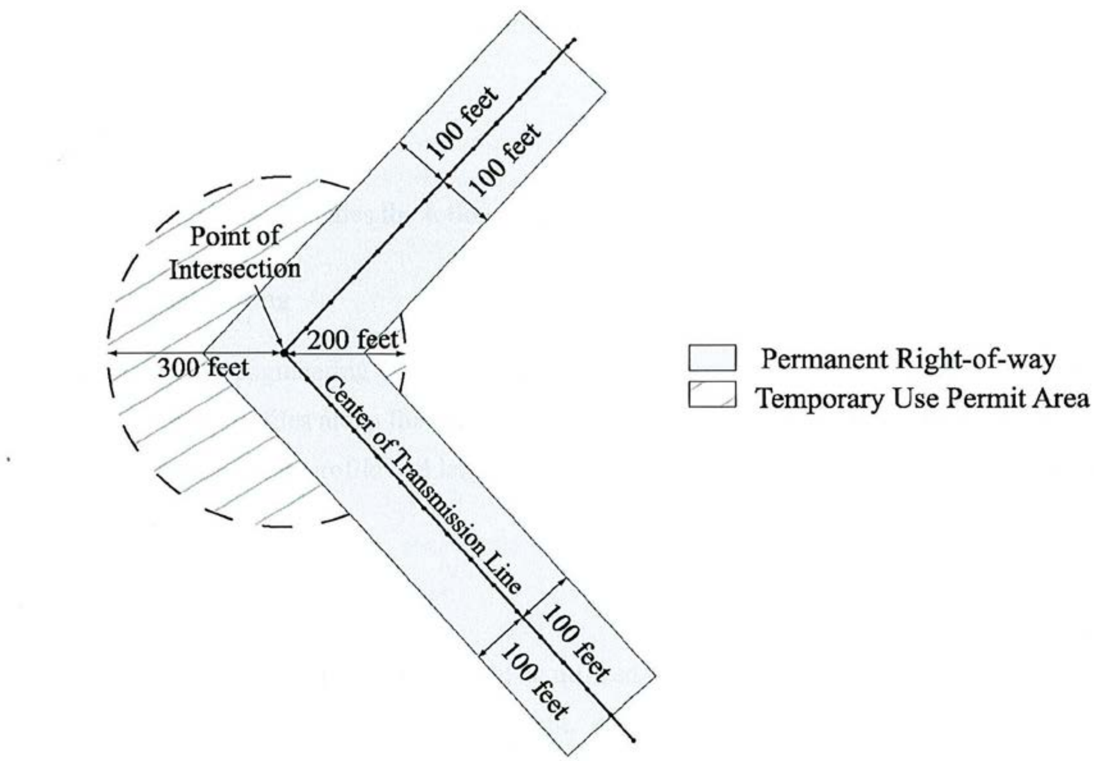
Construction of Tie-line and Temporary Use Areas

A right-of-way, 200 feet in width and extending the length of the transmission tie-line would be required across Forest Service-managed lands and lands managed by the ASLD. The right-of-way would extend 100 feet to either side of the tie-line structures. A portion of the proposed transmission tie-line would follow an existing cattle trail west out of the proposed wind park to minimize new land disturbance. An authorization for the long-term use of existing and newly constructed roadways outside of the right-of-way would be obtained from the Forest Service.

Construction of the transmission tie-line would potentially require temporary construction areas extending outside of the 200-foot-wide right-of-way. If necessary, a temporary use permit for these areas would be obtained from the Forest Service. If additional areas are needed, they would be identified, discussed with the appropriate landowner, and all necessary environmental clearances would be performed. All land rights would be acquired in accordance with applicable laws and regulations governing acquisition of property rights.

Temporary use areas include staging areas, turning structures, and pulling/tensioning sites. Staging areas have been previously described. Pulling/tensioning sites would be located along the transmission tie-line, spaced at 15,000- to 20,000-foot intervals. Each of these sites would be approximately 125 feet by 125 feet. For each turning structure, an area beyond the permanent right-of-way of up to 300 feet on the exterior angle and 200 feet on the interior angle of each turning structure would be required (Figure 2.2-16). Staging areas would be sited to minimize land disturbance for the transmission tie-line construction.

FIGURE 2.2-16
PERMANENT AND TEMPORARY USE AREAS FOR TURNING STRUCTURES



Structure Installation

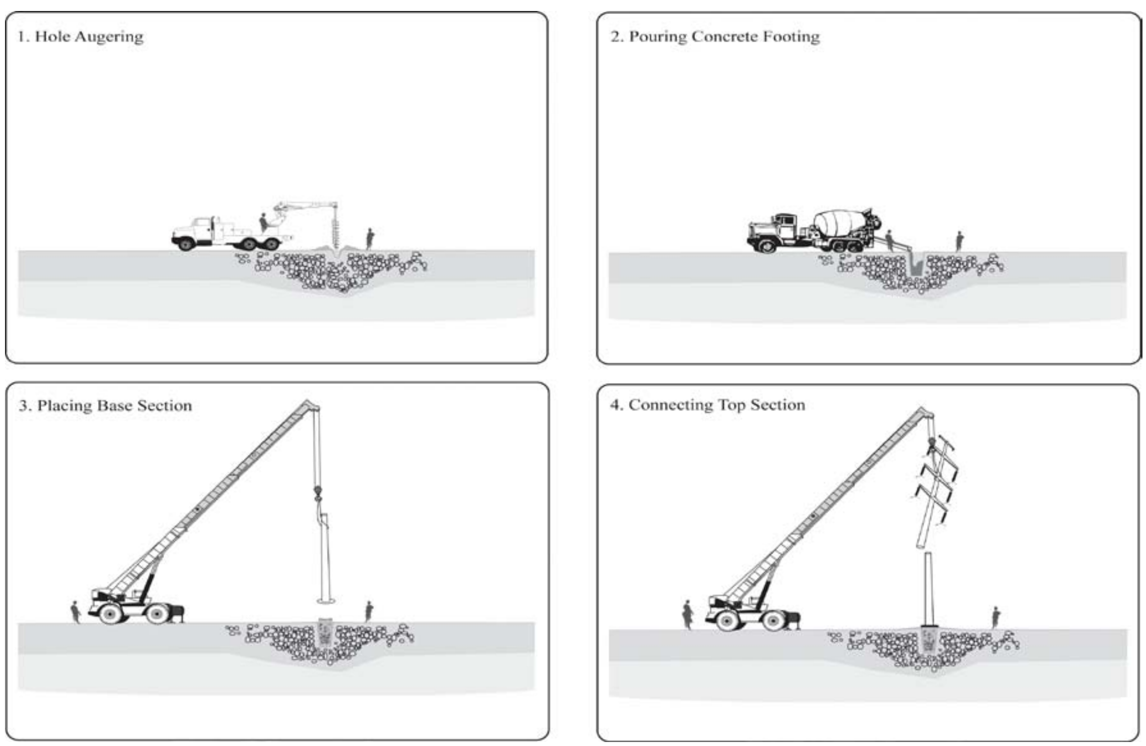
Each structure location would be determined, and access to the site would be constructed as necessary. Structures would generally be spaced 1,000 feet apart; however, this distance could vary depending on topography.

A foundation would be prepared at each structure site. Each foundation would be excavated using a power auger or drill. If rock is encountered, blasting could be required to break up the rock before the hole can be drilled. All safeguards associated with using explosives (e.g., blasting mats) would be employed. Once the hole is bored, a reinforcing steel cage would be inserted, and then the hole would be filled with concrete to form the foundation. Concrete would be sourced from a portable batch plant located within the wind park study area on private and/or State trust land and transported to each foundation location in a ready-mix concrete truck.

Sections of the new monopole structures and associated hardware would then be delivered to each structure site by flatbed truck. Erection crews would use a large crane to position the base section. The base would be secured to the concrete foundation. The remaining sections of the monopole structure would be lifted into place by the crane and secured. Typical steel monopole installation is depicted below in Figure 2.2-17.

While not anticipated at this time, difficult terrain could require that some structures be installed via helicopter.

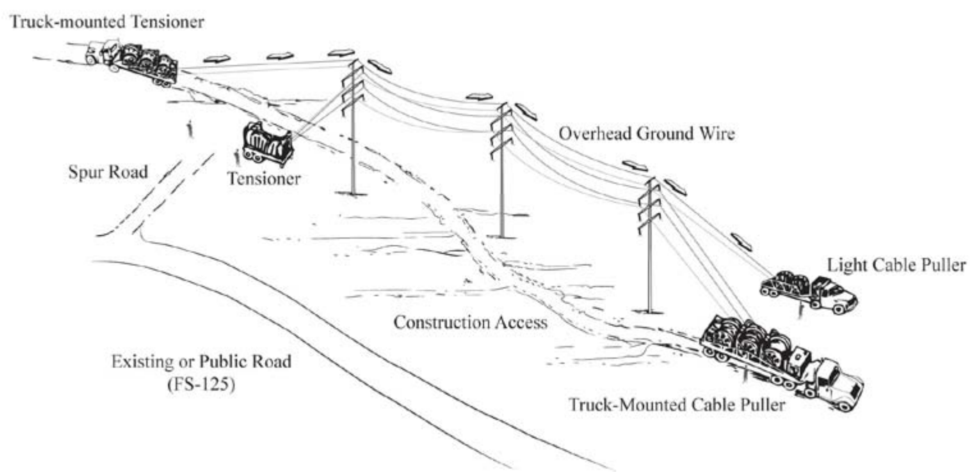
FIGURE 2.2-17
TYPICAL 345-kV STEEL MONOPOLE INSTALLATION



Installation of Conductors, Insulators, Hardware, and Shield Wires

The conductor and ground-wire stringing process is depicted in Figure 2.2-18.

FIGURE 2.2-18
CONDUCTOR AND GROUND WIRE STRINGING ACTIVITIES



Conductor

Conductors would be strung between the structures on the transmission tie-line. Conductor is the wire cable through which the electric current flows. Three conductors would be required to complete a single electrical circuit. Conductors for this project would be steel reinforced aluminum. The aluminum carries most of the electrical current while the steel provides tensile strength to support the aluminum strands. The height of the conductors would be a minimum of 29 feet above the ground, based on standards set forth by the National Electric Safety Code (NESC). The minimum vertical conductor clearances in some instances could be greater in response to logistical requirements or more specific NESC requirements (e.g., sufficient altitude to clear remaining trees).

Once all the structures have been erected, the conductor would be put in place through a process known as “stringing.” Pulling and tensioning sites would be spaced at 15,000- to 20,000-foot intervals and would be located at each end of the transmission tie-line alignment and at turning structures. Stringing equipment at each pulling site would be set up approximately 300 feet from the initial structure. Pulling sites would be about 125 feet by 125 feet, located along the transmission tie-line centerline. Angle structure pulling sites would be located outside the right-of-way because of the need to pull the conductor on a straight line. Reels of conductor and overhead shield wire would be delivered to each of these pulling and tensioning sites. Some earth moving could be needed at pulling and tensioning sites.

Crews would then install insulators and sheaves using a cable truck and a truck with a person lift. Sheaves are rollers attached to the lower end of the insulators at the end of each structure cross-arm. The sheaves allow crews to pull sock lines (rope or wire used to pull power line conductors into place). Once the equipment is set up, a light-weight vehicle would pull the sock line from one structure to the next. At each structure, the sock line would be hoisted to the cross-arm and passed through the sheaves on the ends of the insulators. The sock line would be used to pull the conductor through the sheaves. The conductors would then be attached to the sock line and pulled through each supporting structure under tension. After the conductors are pulled into place, they are pulled to a pre-calculated sag and then tension-clamped to the end of each insulator. Finally, the sheaves are removed and replaced with vibration dampers and accessories.

Insulators and Associated Hardware

Insulators made of an extremely low conducting material, such as porcelain, glass, or polymer, would be used to suspend the conductors from each structure. Insulators inhibit the flow of electrical current from the conductor to the ground, or from one conductor to another conductor. A permanent assembly of insulators would be used to position and support each of the three conductors to the structure. These assemblies are “I”-shaped. The assemblies of insulators are designed to maintain electrical clearances between the conductors, the structure, and the ground.

Overhead Ground Wires (Shield Wires)

To protect conductors from lightning, two overhead ground wires about one-half inch in diameter would be installed on top of the structures. Energy from lightning strikes would be transferred through the ground wires and structures into the ground. One ground wire could also contain fiber optic cable to serve, in part, as a communications system for the project.

2.2.2.3 Operation and Maintenance of the Tie-line

The transmission and extension tie-lines would be operated from a remote power control center. The proposed transmission tie-line system would operate at 345 kV. The amount of power transferred along the conductors would vary depending on seasonal and time-of-day loads, as well as other system demands.

The proposed transmission system would be maintained by monitoring, testing, and repairing equipment. Typical maintenance activities include:

- Periodic routine aerial inspections with emergency aerial inspections after storms, severe wind, lightning, other weather factors, wildfire, or reported vandalism.
- Periodic and emergency ground inspections.
- Routine maintenance to inspect and repair damaged structures, conductors, and insulators.
- Emergency maintenance to immediately repair transmission lines damaged by storms, floods, vandalism, or accidents. Emergency maintenance would involve prompt movement of crews to the site.
- Access road maintenance to regrade and fill gullies, clear and repair culverts, and repair erosion-control features and gates.
- Vegetation management activities would occur approximately every three to five years within the 200-foot-wide right-of-way, consistent with standard practices, and would include cutting, trimming, lopping, and clearing trees, brush, noxious weeds, and undergrowth.

2.2.2.4 Summary of the Tie-line and Ground Disturbance and Reclamation Activities

Table 2.2-6 provides estimates of temporary and permanent ground disturbance associated with construction, operation, and maintenance of the proposed 345-kV transmission tie-line.

TABLE 2.2-6 GROUND DISTURBANCE ESTIMATES FOR TRANSMISSION TIE-LINE		
Facility	**Temporary Ground Disturbance (acres)**	**Permanent Ground Disturbance (acres)**
Mobilization and staging	12–18	0
Access and spur roads	18–24	18–24
Turning structures	24	0*
Structure installation	291–347	1
TOTAL	345–413	19–25
*Permanent disturbance associated with turning structures is incorporated under structure installation.		

Reclamation of Disturbed Areas

A 200-foot right-of-way is generally the area of potential construction disturbance. Additional disturbance would occur within a radius of 150 feet around each structure and within 300 feet of angle structures. Excess soils from structure construction would be spread at the structure location, or if necessary, transported to a suitable off-site disposal location. Temporarily disturbed areas associated with transmission tie-line construction would be reclaimed. These efforts typically include gate repair (if utilized, and as necessary), regrading, revegetation, and waste material removal.

Resource protection measures are included in Table 2.7-1 to address reclamation of disturbed areas.

2.2.2.5 Transmission Tie-line Decommissioning

Once the wind park has reached the end of its useful life and is decommissioned, it is likely that the transmission tie-line would also be decommissioned. Decommissioning provisions are a typical term in land rights agreements and are expected to be required in jurisdictional permits from the Forest Service (special use permit), ASLD (right-of-way easement), and Coconino County (conditional use permit). Decommissioning provisions include stipulations for post-construction and non-compliance. Foresight also has decommissioning and post-construction reclamation provisions in the land lease agreement with the private landowner that would be implemented per the executed lease per Project phase.

2.2.3 Western's Switchyard

Western's proposed 345-kV interconnection switchyard would be located entirely on Forest Service-managed lands about three-quarter mile north of FS 125 and generally within the rights-of-way of Western's two 345-kV transmission lines (Figure 2.2-19). The switchyard is expected to be approximately 650 feet wide by 1,000 feet long. The switchyard facilities would be constructed, owned, and operated by Western. There would be no additional transmission facilities required to interconnect the Applicant's 500 MW generating facility to Western's transmission facilities.

FIGURE 2.2-19
WESTERN'S PROPOSED SWITCHYARD LOCATION

In general, switchyards contain electrical equipment that enables a utility to interconnect different transmission lines, disconnect lines for maintenance or outage conditions, and regulate voltage. The switchyard for this project would contain power circuit breakers, disconnect switches, steel busses, steel poles, cables, metering equipment, communication equipment, AC/DC batteries, and other equipment. A breaker is a switching device that can automatically interrupt power flow on a transmission line at the time of a fault, such as a lightning strike, trees or tree limbs falling on a line, or other unusual event. Disconnect switches are used to mechanically or electrically disconnect or isolate equipment. Switches are normally located on both sides of circuit breakers. Power moves within the switchyard and between breakers and other equipment on rigid aluminum pipes called bus tubing. This tubing is supported and vertically elevated by pedestals called bus pedestals. Figure 2.2-20 depicts a typical 345-kV switchyard.

The proposed switchyard would include several bays. Eight 345-kV power circuit breakers would be installed within the switchyard and used to automatically interrupt power flow on the transmission tie-line at the time of a fault. One bay within the switchyard would accommodate the wind generating facility. Another bay would include three 345-kV gas-filled breakers that would connect the proposed wind generating facility to the grid. Other bays would accommodate the Glen Canyon-Pinnacle Peak No. 1 and No. 2 transmission lines.

In addition, an oil-filled 10-megavolt amphere (MVA) 345/34.5-kV transformer to three (3) 34.5-kV underground conductors to serve an 150-kilovolt amphere (KVA) 277/480 volt transformer would be installed within the switchyard to provide station electrical service, since station service is unavailable from other sources. During the design of the switchyard, a determination would be made on the need for secondary containment per Clean Water Act requirements. If required, secondary containment would be installed within the substation to prevent the migration of oil from the substation site. Backup station service would be provided by an on-site generator located within the substation.

FIGURE 2.2-20
TYPICAL 345-kV SWITCHYARD

2.2.3.1 Engineering Surveys for the Switchyard

Pre-construction aerial and/or ground surveys would locate the switchyard property lines and corners, provide accurate ground profiles, locate structures, and determine the exact locations and rough ground profiles for new access roads. This information would help complete legal descriptions of properties to be used for the switchyard. Soils would be tested to determine physical properties, including the ability to support the proposed structures.

2.2.3.2 Construction of the Switchyard

The 345-kV switchyard would temporarily require about 24 acres during construction and 15 acres permanently. Construction of the switchyard would take place in approximately seven months over a two year period, depending on weather and outages required on the Western/Colorado River Storage Project system and following equipment procurement and delivery. Construction would be completed by approximately 20 to 30 workers on-site at any given stage of the construction process. Construction vehicles and equipment that would be needed for the construction of the switchyard include large cranes, heavy backhoe and earthmovers, large forklifts, and various power tools. Access roads would be constructed using typical road construction equipment, including a bulldozer, grader, front-end loader, and excavator.

Construction of the switchyard and interconnection facilities would involve several stages of work including access road construction and/or improvement; grading of the switchyard area; construction of foundations for transformers, steel work, breakers, control houses, and other outdoor equipment.

Switchyard Mobilization and Staging

A temporary staging area would be developed on approximately three to four acres adjacent to the switchyard site. The staging area would be used for construction safety meetings, to host office trailers, temporary sanitation stations, parking for equipment, vehicle parking for equipment operators and construction workers, and staging for limited project components.

The staging area would be prepared by clearing and grading as needed. The area would then be covered with four to six inches of gravel to provide a level ground surface. The gravel would be obtained from an outside contractor and trucking companies and would be certified weed free. Excess spoil material and topsoil salvaged from the site would be used for reclamation of the area after construction or for top-fill in other construction areas. Water or other approved dust suppressant would be used during the grading of the staging area.

Construction of Switchyard Access Roads

Primary construction and maintenance access to the switchyard site would come from Lake Mary Road to FS 125. A short piece of a paved segment of FS 125 could need to be modified within the existing road area to reduce the grade at a high point to facilitate passage of large equipment. From FS 125, the switchyard would be accessed via Western's current easement. An existing access road within this easement would be improved to allow movement of construction vehicles.

Improvements to Western's existing access road would involve vegetation clearing, excavating current groundcover to a depth of up to 12 inches, and placing approximately 4 to 6 inches of aggregate from off-site sources or the borrow pits located in the wind park study area. The road surface would then be graded and compacted. Berms and other drainage features would be constructed as required. Topsoil removed during road construction would be used for top fill, or stockpiled for berms and other drainage features.

Switchyard Site Grading and Preparation

The 15-acre site would be cleared and leveled with a grader and backhoe. The area would then be covered with about 6 inches of aggregate. Western would require its construction contractor to comply with federal, state, and local noxious weed control regulations, including a clean vehicle policy, while entering and leaving the switchyard construction site. The construction contract would give the contractor detailed information on ground cover for the switchyard. The primary purpose of the aggregate is to provide insulating properties to protect operation and maintenance personnel from electrical danger. Water or other approved dust suppressant would be used during the clearing and grading of the switchyard site. Less than ten acre-feet of water would be required at the switchyard site.

Installation of Components

Concrete footers and foundations would be poured for the bus work and control building. The concrete would come from an outside contractor. Transformers, breakers, control houses, and other outdoor equipment would be transported to the site for installation. Lastly, steel work and electrical work for all of the required terminations would occur.

Communication Facilities

Western requires dual and redundant communication with its switchyards. A microwave communication tower would be installed within the new switchyard to deliver signals to operate switchyard equipment from control centers and other remote locations and to report metering. The microwave system would also provide voice communication from dispatchers to maintenance personnel. New communication equipment would be installed at the switchyard. Microwave communications require an unobstructed "line of sight" between antennas. A tower approximately 60 feet high would be constructed at the switchyard with a microwave antenna aimed toward an existing communication link on Mount Elden, approximately 25 miles northwest of the proposed switchyard site.

A second communication system would be provided by radio.

2.2.3.3 Construction of the Transmission Interconnection

Western would install four new in-lead dead-end structures to provide a tie with the new switchyard and the existing Glen Canyon-Pinnacle Peak transmission lines. Each dead-end structure would be a heavy duty galvanized steel monopole structure and provide a tie into the new switchyard. It is envisioned that the new structures would be located on Forest Service-managed lands within the existing Glen Canyon-Pinnacle Peak transmission lines rights-of-way in the span between four existing towers near the proposed switchyard site. Also, depending on design considerations, existing structures near the new switchyard site could need to be modified to accommodate the interconnection. Once the new dead-end structures are installed, and upon completion of the new switchyard, the existing Glen Canyon-Pinnacle Peak transmission lines' conductors in the span above the switchyard would be cut and attached to the new dead-end structures. New conductors would be installed from the new dead-end structures to A-frame tubular steel take-off structures within the switchyard then on the bus tubing within the switchyard.

2.2.3.4 Operations and Maintenance of the Switchyard

<u>Switchyard Start-Up</u>

Switchyard start-up would follow a detailed plan for testing and energizing the step-up substations, transmission tie-line, and interconnection switchyard in a defined sequence with lock and tags on breakers to ensure safety and allow for fault detection prior to energizing any component of the system. Switchyard start-up would not require any heavy machinery to complete.

<u>Operation and Maintenance Activities</u>

During operation of the new switchyard, authorized Western personnel would conduct periodic inspections and service equipment as needed. Properly trained maintenance personnel would monitor and manage the use, storage, and replacement of gas-filled breakers to minimize any releases to the environment. During inspections, equipment would be monitored for detection of leaks and repairs would be made as appropriate.

The switchyard would be designed to operate from a remote location, and no permanent employees would be required.

<u>Operation and Maintenance Access</u>

Access to the switchyard for both construction and operation and maintenance would be from the existing access road associated with the Glen Canyon-Pinnacle Peak 345-kV transmission lines. This access road could be improved, but would remain open. Gates would be located at the entrance to the switchyard.

<u>Communication Facilities</u>

Communication facilities would be inspected and serviced as needed by authorized Western personnel.

2.2.3.5 Summary of the Switchyard and Ground Disturbance and Reclamation Activities

Temporary and permanent ground disturbance estimates from construction, operations, and maintenance of the switchyard are provided in Table 2.2-7.

TABLE 2.2-7 PERMANENT AND TEMPORARY GROUND DISTURBANCE ASSOCIATED WITH THE SWITCHYARD		
Facility	**Temporary Ground Disturbance (acres)**	**Permanent Ground Disturbance (acres)**
Staging area	3	0
Access roads	2	2
Switchyard	15	15
In-lead Dead-end Structures	4	0
TOTAL	24	17

2.2.3.6 Switchyard Decommissioning

Decommissioning provisions are a typical term in land rights agreements and are expected to be included in the final Forest Service special use permit for Western's switchyard. If the wind park facility is decommissioned, Western may not decommission the switchyard since its addition would enhance transmission operations. If decommissioned, the proposed switchyard would be in compliance with Forest Service special use permit provisions for decommissioning.

2.3 ALTERNATIVE TRANSMISSION TIE-LINE CORRIDOR

Foresight, in coordination with the Forest Service, has proposed a route for the transmission tie-line as discussed in Section 2.2.2. The Forest Service has also identified an alternative route for the transmission tie-line to differently address potential effects to visual resources. Both the proposed route and alternative route were evaluated to address potential effects to visual resources and avoid or minimize impacts to other resources. As with the proposed transmission tie-line, a portion of the alternative transmission tie-line would follow an existing cattle trail west out of the wind park to the top of Anderson Mesa. The proposed and alternative transmission tie-line would then parallel FS 125 west to a point approximately one-third mile east of the intersection of FS 9483g. At this point, the alternative transmission tie-line corridor would then proceed north approximately one-quarter mile before veering to the west into the interconnection switchyard (Figure 2.3-1). The wind park and interconnection switchyard would be located in the same location and constructed in the same manner as described under Foresight's Proposed Project in Section 2.2.

Similar to the transmission tie-line included in Foresight's Proposed Project (Section 2.2.2), the alternative transmission tie-line would require approximately 80 structures and would be approximately 15 miles long, extending 8.5 miles across Forest Service-managed lands and 6.5 miles across State trust and private lands. The alternative action would result in slightly more ground disturbance than the transmission tie-line associated with Foresight's Proposed Project because it uses less existing roads. Ground disturbance for the alternative action is estimated to be 346–414 acres of temporary disturbance (approximately one acre more than Foresight's Proposed Project transmission tie-line) and 20–26 acres of permanent disturbance (approximately one acre more than Foresight's Proposed Project transmission tie-line).

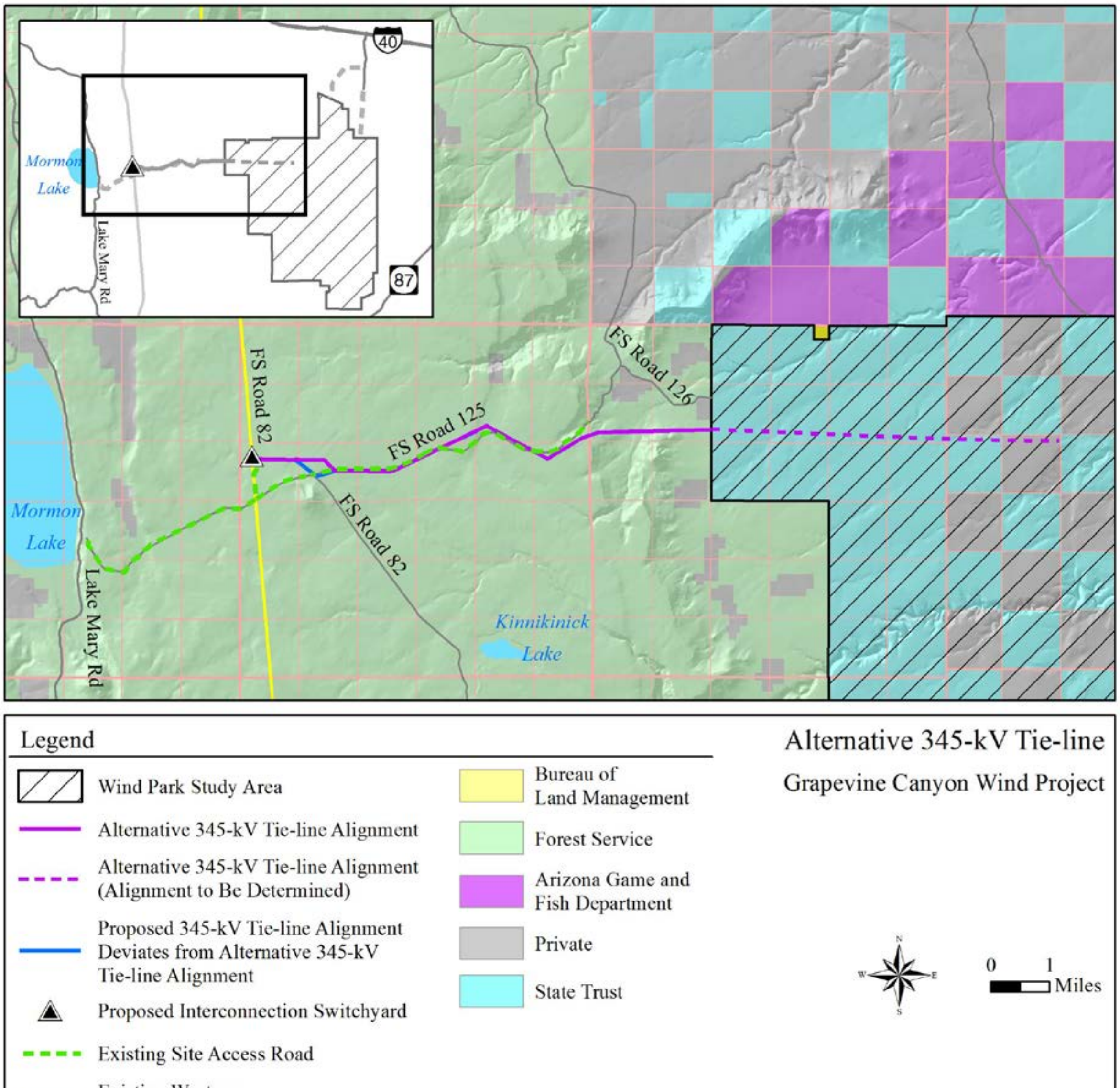


FIGURE 2.3-1

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, Western would deny the interconnection request and the Forest Service would not permit facilities to be placed on Forest Service-managed lands. For the purpose of impact analysis and comparison in this Final EIS, it assumed that the proposed wind park would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur.

2.5 COMPARISON OF ALTERNATIVES

TABLE 2.5-1
COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES

Resource	Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard	Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard	No Action Alternative
Land Use	Development of the up to 500 MW wind project would result in a permanent conversion of 591–627 acres of land from grazing to other use. Approximately 97 percent of the wind park site area would remain available for grazing per phase.	Development of the up to 500 MW wind project would result in a permanent conversion of 592–628 acres of land from grazing to other use, slightly more than under the proposed wind park, tie-line, and Western's proposed switchyard. Impacts would not be noticeably different than those described under the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would result in no change to existing land uses.
Biological Resources	Construction of the wind park is expected to temporarily disturb 2,050–2,193 acres and permanently disturb 555–570 acres of scrub-shrub, grassland, and a small amount (less than 2 percent) of evergreen forest. Construction of the transmission tie-line and switchyard is expected to temporarily disturb 345–413 acres and permanently disturb 19–25 acres of grassland, pinyon-juniper woodland, and a small amount (less than 3 percent) of ponderosa pine forest. Landcover types and habitats found within the wind park study area and adjacent to the transmission tie-line and switchyard are not unique to the surrounding landscape or region.	Construction of the wind park is expected to temporarily disturb 2,050–2,193 acres and permanently disturb 555–570 acres of scrub-shrub, grassland, and a small amount (less than 2 percent) of evergreen forest. Construction of the alternative tie-line and switchyard is expected to temporarily disturb 346–414 acres (approximately 1 acre more than Foresight's proposed transmission tie-line alignment) and 20–26 acres of permanent disturbance (less than 1 acre more than Foresight's proposed tie-line alignment). The alternative tie-line route would affect open grassland. Impacts to special status species; birds, raptors, and bats; and big game would not be noticeably different than those under the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect to biological resources.

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Biological Resources (continued)	Special status plant species have highly restricted distributions and very specific habitat requirements and are not expected to occur within the wind park study area based on either an absence of habitat, range, or distribution. Canyon bottoms containing riparian areas, deciduous woodlands, wetlands, or waterbodies may support wetland and mesic plant species would be mostly avoided by wind park facilities. Federally-listed Mexican spotted owls are known to occur in the Forest in the vicinity of the transmission tie-line, and while the species move through the area, suitable nesting habitat is not present within or immediately adjacent to the proposed transmission tie-line evaluation area. The USFWS provided comments to the Draft EIS stating that the Federally-listed Mexican gartersnake and Chricahua leopard frog are not believed to occur or be affected by the project. Implementation of these RPMs during construction and operation of the wind park facilities would minimize impacts to these species. Construction and operation of the proposed project may result in direct impacts to the birds, raptors, and bats through collision and/or electrocution with the wind turbines and power lines. RPMs include additional pre-construction surveys, preparation of an ABPP, constructing outside of bird nesting season or nest area avoidance, adherence to the Avian Power Line Interaction Committee suggested practices for avian protection on power lines, and formal post-construction monitoring study designed to estimate and address avian and bat mortality.		

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Biological Resources (continued)	Construction activities may cause short-term impacts to big game such as antelope, mule deer, and elk populations. Big game behavior and movement throughout the area of potential disturbance may be affected, but operation of project facilities is not expected to have long-term impacts on big game behavior or movement patterns. Population trends and habitat viability associated with these species would not be impacted by construction and operation of the wind park, transmission tie-line, and switchyard.		
Cultural Resources	Would directly disturb between 2,419–2,630 acres of land within areas known to have been used prehistorically and historically. Research identified 678 previously recorded cultural resources within the cultural resources evaluation area for the proposed project facilities. Twenty-four of the sites potentially occur within 100 feet of the wind park study area, transmission tie-line, and/or switchyard. Of the 24 sites identified during the background research, 4 of these are recommended as eligible for listing on the NRHP. The preliminary layout plan for the primary access road was prepared to avoid impact to these sites. Western would consult with the signatories to the PA to determine the NRHP eligibility for 12 newly recorded sites and seven rock cairns based on the Class III pedestrian surveys completed for the proposed project. Of the 12 newly recorded sites, 9 are associated with the proposed transmission tie-line and 3 sites and rock cairns are associated with the proposed primary site access road. The preliminary layout plan for the proposed access road was prepared to avoid impacts to those sites and rock cairns.	Would directly disturb between 2,420–2,631 acres of land within areas known to have been used prehistorically and historically, slightly more than the proposed wind park, transmission tie-line, and Western's proposed switchyard. Impacts would not be noticeably different than those under the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on cultural resources.

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Cultural Resources (continued)	The development of wind park and transmission tie-line facilities may also indirectly impact areas of interest to Native Americans such as sacred areas, or areas used for collecting traditional resources such as birds and medicinal plants. Visual impacts on significant cultural resources such as sacred landscapes, historic trails, and viewsheds from other types of historic properties (e.g., homes and bridges) may also occur. In addition, there may be visual impacts on TCPs because the visible wind turbines may be perceived as an intrusion on a sacred or historic landscape that could result in a significant adverse effect to these TCPs.		
Geology and Soils	Would temporarily disturb between 2,419–2,630 acres of land and would permanently remove vegetation from and alter the surface of 591–627 acres of land. This would result in increased erosion and the permanent loss of soils.	Would temporarily disturb between 2,420–2,631 acres of land and would permanently remove vegetation from and alter the surface of 592–628 acres of land. Impacts would be slightly greater than those described under the proposed wind park, transmission tie-line, and Western's proposed switchyard because the transmission tie-line associated with the alternative action requires a new access road across moderately erosive soils that are difficult to revegetate.	Would have no effect on geology and soils.
Air Quality	Air quality impacts would be minimal, generally resulting from emissions and fugitive dust from equipment and vehicle operations during construction. Air quality impacts would be greatest during the construction period with fugitive dust emissions primarily from earthmoving, construction vehicle exhaust emission, and fugitive and point sources associated with the concrete batch plant. Operational impacts would be minimal because WTGs do not have emissions. There are emissions and dust associated with maintenance vehicle traffic. RPMs have been identified to further reduce the effects to air quality and there would be no measurable impact.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on air quality.

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Water Resources	Construction would require approximately 307 acre-feet of groundwater if the wind park is built out to 500 MW. Operations would require a negligible amount of water. Soil erosion and sedimentation would increase as a result of the temporary disturbance of between 2,419–2,630 acres of land as would the permanent disturbance and removal of vegetation from 591–627 acres of land. Potential impacts to waters of the U.S. or wetlands identified by the Forest Service could result from construction, operation, and maintenance of the proposed wind park and transmission tie-line. Potential impacts include placement of fill or removal of materials and vegetation; altered flows or sediment transport; spills of contaminating materials; increased scour and erosion downstream; and construction of diversions, culverts, and below grade utility structures.	Construction and operations would require the same amount of water as the proposed wind park, transmission tie-line, and Western's proposed switchyard. Between 2,420–2,631 acres of land would be disturbed temporarily and 592–628 acres of land would be permanently disturbed resulting in erosion and sedimentation. Impacts to preliminary jurisdictional washes would not be noticeably different than those described under the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on water resources.
Water Resources (continued)	Approximately 262 miles of potential jurisdictional waters have been observed in the up to 500 MW wind project study area. The impact of the initial phase is expected to affect approximately one-half acre for the initial phase study area, subject to USACE determination. Preliminarily, a similar impact for the build-out phase(s) study area in anticipated, also subject to USACE determination. It is expected through avoidance of features identified as jurisdictional waters of the U.S. to the extent practicable and through implementation of RPMs and other best management practices, to reduce impacts to jurisdictional features to the least environmentally damaging approach that can be achieved as required through the Clean Water Act Section 404 permitting process.		

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Socioeconomics	Would result in the employment of approximately 400 workers directly, or through local or regional construction and service contract firms, during construction and between 17–40 workers during regular operations for a typical 500 MW wind park. This would lead to a slightly greater demand on public facilities, including schools. Vacancy rates in housing units in the region suggest capacity is available for this level of employment. In addition, the project would create a supplemental source of revenue to ranchers and State trust land beneficiaries and provide new tax revenues to the County and State.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would not realize the economic objectives of the Diablo Canyon Rural Planning Area since no similar economic development proposals are currently under consideration.
Environmental Justice	Would result in additional employment opportunities and tax revenue that would benefit directly or indirectly persons living below the Federal poverty level.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on environmental justice, beneficial or otherwise.
Transportation	Would result in a short-term (12–18 months per wind park phase) increase in construction related traffic of over 400 two-way vehicle trips each day during peak construction activity on I-40 and Meteor Crater Road and approximately 25 two-way vehicle trips each day on Lake Mary Road and FS 125. It would result in a minimal long-term increase in vehicular traffic on I-40 and Meteor Crater Road. Impacts would be proportionally reduced for project phases.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard. Impacts would be proportionally reduced for project phases.	Would have no effect on transportation.
Health, Safety, and Security	Would create minimal occupational hazards, public safety, and environmental hazards during construction and operations.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on health and safety.
Noise	Construction equipment would elevate ambient noise levels substantially over the short-term (12–18 months per wind park phase) during certain construction activities, but operations would result in a minimal increase in ambient noise levels that would dissipate over a short distance.	Would be the same as the proposed wind park, transmission tie-line, and Western's proposed switchyard.	Would have no effect on noise.

TABLE 2.5-1 COMPARISON OF EFFECTS TO RESOURCES FOR ALTERNATIVES			
Resource	**Proposed Wind Park (500 MW), Transmission Tie-line, and Western's Proposed Switchyard**	**Proposed Wind Park (500 MW), Alternative Transmission Tie-line Corridor, and Western's Proposed Switchyard**	**No Action Alternative**
Visual Resources	Would result in a visual contrast by introducing contrasting elements of form, line, and color. In addition, the proposed transmission tie-line would result in a Visual Quality Objective of Modification within an area on Forest System-managed lands for a Visual Quality Objective of Partial Retention.	Effects would generally be the same as those described under proposed wind park, transmission tie-line, and Western's proposed switchyard except the tie-line would be routed to avoid the more sensitive area (Partial Retention) on Forest System-managed lands.	Would have no effect on visual resources.

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM CONSIDERATION

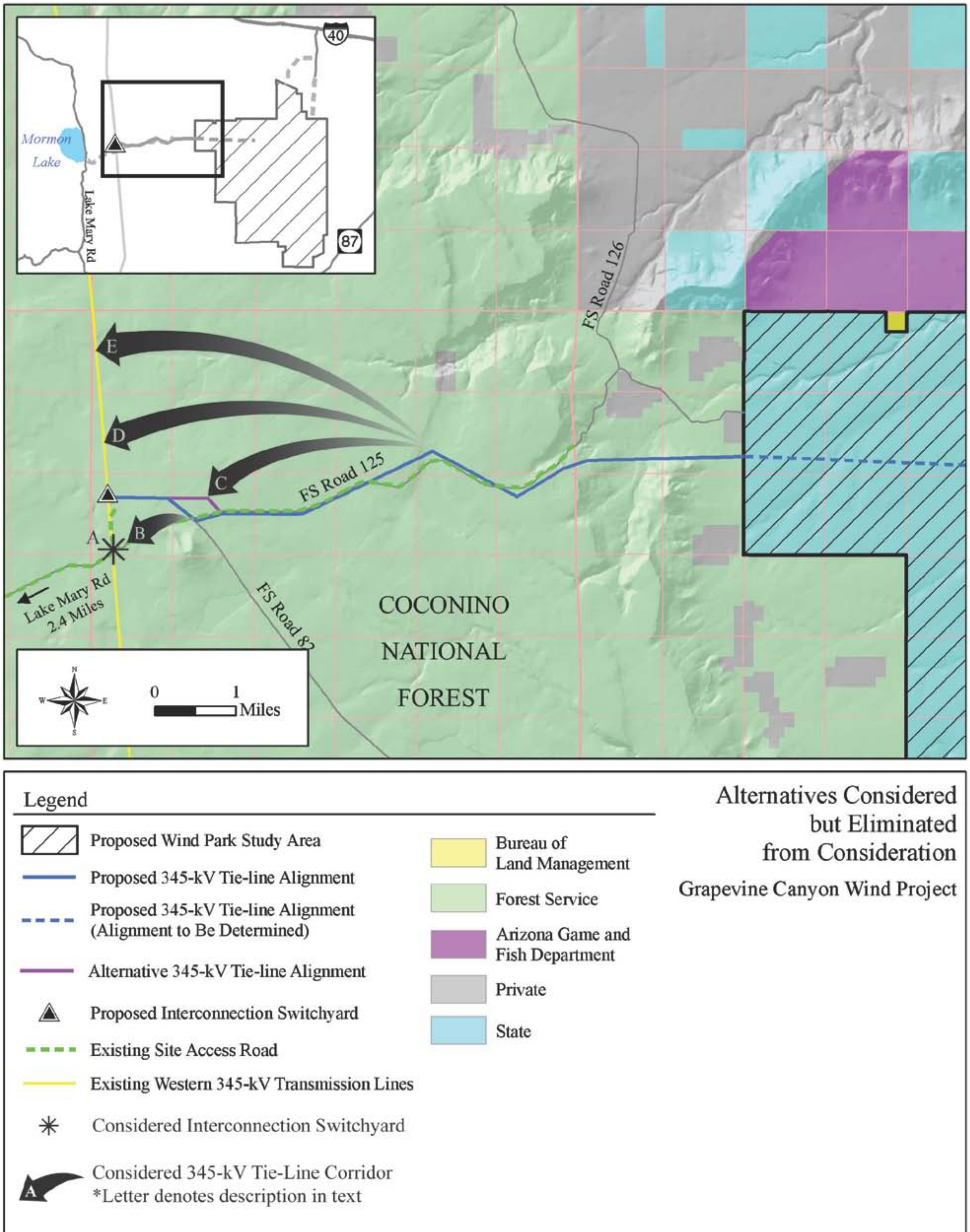
Several alternatives to the location and/or design of the proposed project elements on Federal land were considered during development of this project. An alternative was not carried forward for full analysis if there were issues with cost, construction feasibility, environmental resource sensitivities, and conformance with applicable land use plans. Based on these criteria, a number of alternatives were not carried forward for further consideration as described in Table 2.6-1 along with rationale for their elimination and are roughly depicted on Figure 2.6-1. Alternatives addressing the location of the proposed wind park were not evaluated since no alternative locations were proposed during the EIS scoping process, and decisions and actions related to the proposed wind park are outside of the decisions that would be made by Western and the Forest Service. The wind project location was selected for its proximity to the interconnection location and screening factors as noted in Section 2.2 above.

Comments on the Draft EIS were received that suggested expanding the alternatives analysis in the Final EIS to include either alternate site locations or on-site alternatives that demonstrate a reduction of impacts, and an alternative that defines the project area as Study Area A and eliminates Study Areas B and C. Western considered the alternatives suggested to Foresight's proposed wind park and has determined that the EIS will not fully analyze them because Western's decision is limited to whether to grant the interconnections at the proposed switchyard.

TABLE 2.6-1 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM CONSIDERATION		
Alternative Description	**Rationale for Elimination**	**Figure 2.6-1 Location**
Bury the transmission tie-line underground.	High costs for installation and repair, 2–4 times more expensive than overhead lines; adds considerable time for maintenance and repair. There would be more temporary land disturbance and environmental impacts versus overland structure placement as proposed.	—
Locate the interconnection switchyard at the intersection of FS 125 and the Western 345-kV transmission lines.	Would not provide a direct line of site to a communications tower atop Mt. Elden; would be located within an area managed by the Forest Service as Partial Retention for visual resources, and would require a Forest Plan amendment.	A

TABLE 2.6-1
ALTERNATIVES CONSIDERED BUT ELIMINATED FROM CONSIDERATION

Alternative Description	Rationale for Elimination	Figure 2.6-1 Location
Site the transmission tie-line adjacent to FS 125 from the top of Anderson Mesa to the Western 345-kV transmission lines.	This site is located within an area managed for visual resources and would require a Forest Plan amendment.	B
Site the transmission tie-line approximately one-quarter mile north of FS 125.	Would be located within the foreground viewshed of FS 125 towards the San Francisco Peaks.	C
Site the transmission tie-line approximately one mile north of FS 125.	Would be located within the middleground viewshed of FS 125 towards the San Francisco Peaks; would be located within a prairie dog town.	D
Site the transmission tie-line approximately two miles north of FS 125.	Would be a considerably longer route affecting more wildlife habitat, including a prairie dog town and an area actively managed for pronghorn antelope.	E



Alternatives Considered but Eliminated from Consideration

Grapevine Canyon Wind Project

FIGURE 2.6-1

2.7 FORESIGHT AND AGENCY RESOURCE PROTECTION MEASURES

Foresight and agencies have proposed RPMs by resource area for the proposed project and proposed Federal actions to minimize impacts associated with construction, operation, and maintenance. Foresight and agencies have committed to these RPMs, and they are included in the evaluation of environmental impacts. Western and the Forest Service do not have jurisdiction over the siting, construction, or operation of the proposed wind park, so their proposed measures only apply to the proposed switchyard (Western) and the proposed switchyard and transmission tie-line (Forest Service). Western, Forest Service, and Foresight are signatories on the PA for compliance with the National Historic Preservation Act (NHPA), and thus would abide by the provisions in the PA addressing effects to properties on or eligible for listing to the National Register of Historic Places (NRHP).

Foresight would follow standard construction practices, Best Management Practices (BMPs), and RPMs during the construction, operation, and maintenance of the proposed wind park and transmission tie-line facilities. These measures could be imposed by State, local, or other jurisdictions as the result of approvals for storm water management, grading permits, building permits, etc., or would be implemented based on Foresight's construction practices. Some RPMs have been designed to address direct and indirect impacts to birds and bats during construction and operation based on additional impact assessments and data acquired during actual construction and operation. To implement the RPMs, an Avian and Bat Protection Plan (ABPP) is being voluntarily developed with USFWS and Arizona Game and Fish Department (AGFD). The ABPP includes components such as additional pre-construction wildlife studies to inform final micro-siting of the initial project phase, post-construction wildlife studies and monitoring operational impact levels that are based on the Wind Turbine Guidelines Advisory Committee (WTAC) Tier 4 framework (USFWS 2010). An Adaptive Management protocol would be implemented within the ABPP whereby iterative decision-making (evaluating results and adjusting actions on the basis of what has been learned) would be undertaken to reduce or avoid impacts to biological resources. Operational practices could be refined based upon observed impacts which have been documented as occurring at the project. Data collected during monitoring studies or facility operation would be used to help inform operational practices in addition to consultation with wildlife or biological experts, consultants, agency personnel, landowners and other stakeholders.

The Forest Service has proposed certain measures that would be binding on Foresight for the proposed transmission tie-line and on Western for its proposed switchyard, if adopted by the Forest Service. In addition, Western requires its construction contractors to implement standard environmental protection provisions. These provisions are provided in Western's Construction Standard 13 (Appendix A) and would be applied to the proposed switchyard. Specific BMPs that the Forest would require for soil and water resources for the proposed transmission tie-line and switchyard, as well as invasive species management, are found in Appendix C. Table 2.7-1 below summarizes Foresight's and agency's RPMs as would be applied to the proposed project components.

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
LAND USE			
Foresight would work closely with landowners and state and Federal land managers to site access roads to minimize land-use disruptions to the extent possible. Infrastructure and roads shown in the preliminary layout plan have been minimized to reduce fragmentation of the landscape and impacts to native habitats to the extent possible. Wherever possible, existing roads have been, and would be, utilized during facility design. The transmission tie-line route utilizes existing disturbed areas to minimize fragmentation and the extent of vegetation removal necessary.	X		
Prior to construction, Foresight would prepare a Hunter Education and Access Plan in coordination with AGFD. The Plan would provide for public notice regarding construction activities and timeline, written notice to pronghorn and elk hunting permittees for Unit B, and a sign-in kiosk at public access points to the construction project.	X		
In the event of unexpected property damage caused by the activities during project construction, Foresight, Forest Service, or appropriate authority would quickly investigate and reasonably attempt settlement with the party who incurred property damages.	X		X
Concrete wastes shall not be disposed of on any Western property, right-of-way, or easement or on any streets, roads, or property without the owner's or land management agency's consent.		X	

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
BIOLOGICAL RESOURCES			
Special status species including Federally-listed threatened and endangered or candidate species, USFWS birds of conservation concern, Arizona Partners in Flight Priority Species or State wildlife species of special concern would continue to be considered during post-EIS phases of the proposed project's development following permit conditions set forth by the appropriate land or resource managing agency. This could entail conducting pre-construction surveys for aforementioned special status species along access and spur roads, staging areas, and construction sites as agreed upon by the land or resource managing agency. Additional pre-construction clearance surveys are being conducted, or are planned, for sensitive biological resources in consultation with USFWS and AGFD. In cases where such species are identified, appropriate action would be taken to avoid adverse impacts on the species and its habitat and could include, but is not limited to, mitigation or altering the placement of roads or structures as practical and monitoring construction activities. Any further measures to implement these RPMs would be planned in consultation with the USFWS and AGFD. Information collected during post-construction studies for the initial phase would also help to inform siting of subsequent phases and would be reported as part of the ABPP being voluntarily developed for the wind park in consultation with the USFWS and AGFD.	X		X
Prior to the start of switchyard construction, Western would provide training to all contractor and subcontractor personnel and others involved in the construction activity in the identification of any Federally-listed threatened, endangered or candidate species, which for this project includes the Federally threatened Mexican spotted owl. Untrained personnel shall not be allowed in the construction area. Western would provide drawings or maps showing sensitive areas located on or immediately adjacent to the transmission tie-line right-of-way and/or facility. These sensitive areas shall be considered avoidance areas. Prior to any construction activity, the avoidance areas shall be marked on the ground (no paint or permanent discoloring agent would be used) by Western. If access is absolutely necessary, the contractor shall first obtain written permission from Western, noting that a Western and/or another Federal biologist could be required to accompany personnel and equipment. Ground markings shall be maintained through the duration of the contract. Western would remove the markings during or following final inspection of the project.		X	

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
Prior to the start of wind park and/or transmission tie-line construction, Foresight would provide training to all contractor and subcontractor personnel and others involved in construction activities in the identification of Federally-listed threatened and endangered or candidate species, USFWS birds of conservation concern, Arizona Partners in Flight Priority Species, or State wildlife species of special concern with the potential to occur in the wind park and transmission tie-line.	X		
Clearing activities associated with construction would occur outside of the bird nesting season to the extent practical in order to reduce impacts to breeding birds and their habitats to the extent possible and comply with the MBTA and other Federal and State laws. Should habitat clearance activities be required during the nesting season—defined as March through September—vegetation clearing activities would include pre-construction clearance surveys and/or biological monitoring by a qualified wildlife biologist. If an active nest for a Federally-listed threatened and endangered or candidate species, USFWS birds of conservation concern, Arizona Partners in Flight Priority Species, or State wildlife species of special concern is found in the project area during construction activities, Foresight would immediately notify AGFD and USFWS and provide the location and nature of the findings. Foresight's contractor would stop all activity within 200 feet of the protected species or habitat while conferring with the appropriate wildlife agency. The Forest Service would also be notified of the finding if on Forest Service-managed lands.	X	X	X
In order to avoid or minimize risk of destruction of bat roost sites during the maternity season, clearing activities resulting in the destruction of snags suitable for roosting bats would be conducted to the extent possible outside the bat maternity season defined here as May through September. If clearing activities must occur during the maternity season, biological monitors would inspect snags immediately prior to clearing to prevent destruction of active bat roosts.	X	X	X

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
Foresight would complete a total of two years of pre-construction avian and bat surveys for the initial phase area prior to construction of that phase. Foresight would complete a minimum of one year of pre-construction surveys within other portions of the wind park study area prior to construction of the initial phase. In addition, Foresight would complete a second year of pre-construction surveys for subsequent phase areas prior to construction of those phases. This would result in the completion of two years of pre-construction data in all developed portions of the wind park study area. These surveys could include: • avian use and breeding bird surveys. • surveys to identify active raptor nests. • surveys for caves, abandoned structures, and/or ground fissures to identify potential bat roosting habitat within the wind park study area. • acoustic monitoring and mist-net surveys for bats. • sensitive species surveys or habitat mapping.	X		
Two years of post-construction studies would be conducted to assess bird and bat fatality rates resulting from operation of the wind park, and fatality monitoring using carcass searches and bias trials would be conducted to produce seasonal and annual fatality estimates. In addition, post-construction use monitoring would be conducted concurrently for bats (using acoustic monitoring) and birds (using point-count methodologies) to replicate pre-construction surveys. Information collected during post-construction studies completed for the initial phase would inform adaptive management of the initial phase and siting and adaptive management of subsequent phases as part of the ABPP being voluntarily developed in consultation with the USFWS and AGFD.	X		
The ABPP being voluntarily developed by Foresight is intended to minimize potential impacts to birds, bats, and their habitats and to ensure compliance with applicable State and Federal laws. It would include, but not be limited to, construction requirements, post-construction avian and bat survey and reporting requirements, avian and bat mortality monitoring, and operational practices. The adaptive management process would draw from a toolbox of operational practices and/or compensatory measures to be implemented as needed if post-construction monitoring demonstrates that impacts are greater than anticipated. This toolbox could include curtailment strategies such as cut-in speed adjustments to reduce bat fatalities, for example.	X		
For the operational life of the proposed wind park, Foresight would document wildlife injuries or fatalities observed and report injuries or fatalities of Federal threatened, endangered and candidate species to USFWS and AGFD.	X		

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
The transmission tie-line and extension tie-line structures, conductors and design would meet suggested practices for avian protection on power lines, as recommended by guidance from the Avian Power Line Interaction Committee (APLIC) in 1994 and 2006 to minimize and mitigate risk of potential avian collisions or electrocutions along the proposed transmission tie-line and any other overhead transmission lines associated with the wind park. To the extent possible, electrical collection lines would be buried underground. A routine maintenance schedule to ensure functionality of APLIC approved bird strike diverters would be defined prior to construction and implemented. All above-ground power lines would include bird diverters per AGFD Guidelines (2009d).	X		X
Foresight would prepare a weed control plan for the wind park and proposed transmission tie-line that is designed to prevent the spread of non-native and invasive species. Foresight would also adhere to BMPs for the proposed transmission tie-line that are expected to be reflected in the Forest Service Special Use Permit, which could include items from *Integrated Treatment of Noxious or Invasive Weeds on the Coconino, Kaibab, and Prescott National Forests within Coconino, Gila, Mojave, and Yavapai Counties, Arizona* (see Appendix C.2), as applicable to the Project.	X		X
Western would require its construction contractor to comply with Federal, State, and local noxious weed control regulations, including a clean vehicle policy while entering and leaving the switchyard construction site.		X	
The final layout plan would take into consideration recommendations in AGFD's *Guidelines to Reducing Impact to Wildlife from Wind Energy Development in Arizona* (2009d) to help reduce and avoid impacts to wildlife.	X		
Fill, rock, or additional topsoil would be obtained from the project area whenever possible. If rock or aggregate is obtained from off-site sources outside the project area, the material would be cleaned prior to entering the project site to prevent the introduction of invasive weeds and plant species.			X
Soil would be stored on or near its original location to minimize impacts to vegetation, reduce the potential for compaction and erosion of bare soils, and minimize the spread of invasive species.			X
All construction vehicles and equipment would be sprayed before initial ingress onto Forest Service-managed lands. A high pressure hose would be used to clear the undercarriage, tire treads, grill, radiator, and beds of any mud, dire, and plant parts that could potentially spread the seeds of noxious plants.		X	X
Foresight would use BMPs described in Forest Service Handbook (FSH) 2509.22 (or as amended) during construction and operation, including revegetating disturbed areas with native grasses and forbs.	X		X

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
During construction and operation, project personnel and all contractors would be instructed to remove garbage promptly to avoid creating attractive scavenging opportunities for birds. Construction of rock piles or other possible rodent den/nest sites would be minimized. Carrion would be promptly removed by project personnel when observed. Vegetation height would be managed around turbines to reduce raptor prey availability.	X		
The aerial limits of construction activities normally would be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate limits of survey or construction activity.			X
A traffic control plan would be developed prior to construction commencement per phase to minimize impacts to wildlife. Speed limits for construction and operations personnel along the access and service roads would be restricted to 25 miles per hour (mph) to reduce the risk of wildlife or livestock collisions and minimize noise. Vehicle movement associated with the project would be restricted to designated access and service roads and temporary construction areas.	X		X
Foresight would develop a Fire Plan, approved by the Forest Service, for the construction, operations, and maintenance of the transmission tie-line. Foresight would develop and implement an Emergency Response Plan for use during wind park and/or transmission tie-line construction and operation. The plan would contain emergency fire precautions, notification procedures, and emergency response sequences. These measures would help reduce or avoid impacts to wildlife.	X		
WTGs would consist of tubular supports with pointed nacelles rather than lattice supports to minimize bird perching and nesting opportunities. External ladders and platforms would not be used on WTGs to minimize perching and nesting opportunities for birds.	X		
Pursuant to FAA regulations all structures associated with the proposed wind park 200 feet above ground level would be lit as directed by the FAA, including the permanent met towers. Flash duration and lighting intensity would be the lowest permissible under FAA regulations that is commercially reasonable. Other facility lighting including lighting for the O&M building would be motion sensor activated rather than continuously lit. Wherever possible, infrastructure lighting would be down-shielded.	X		
Non-disturbance buffers would be established to protect sensitive habitats or areas of high risk for species of concern identified during pre-construction studies.	X		
WTGs would not be sited in canyon bottoms which contain water sources where bird species diversity and/or density could be significantly higher than other areas of the project.	X		

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
If practicable, WTGs would be sited to buffer stock tanks or ponds. If it is not practicable to locate turbines away from stock tanks or ponds, these features would be relocated away from the nearest WTG, if feasible.	X		
Foresight has designed the initial phase to avoid prairie dog towns and buffer raptor nest sites, based on the results of Spring/Summer 2011 field surveys. Prairie dog town mapping was completed during 2007–2008 and during June–August 2011. Additional surveys would be conducted prior to final layout design for the initial build out phase, and this information would be used when developing the final micro-siting layout. The post-construction monitoring survey results for the initial phase would be evaluated to determine whether non-disturbance buffers of prairie dogs would be recommended for future build out phases.	X		
CULTURAL RESOURCES			
Construction and operations activities would be consistent with the PA to ensure that any NRHP-eligible archeological sites and TCPs would be protected.	X	X	X
Consistent with the PA, TCPs or other sensitive areas identified by Tribes in advance of project design would be considered during project design and buffered to the extent practical.	X	X	X
Foresight, Western, and the Forest Service, through the PA, are committed to achieving "no adverse effect" by avoiding NRHP-eligible cultural resources to the extent feasible and practical. Foresight would move, modify, or cancel impacting activities to reduce or eliminate adverse effects to historic properties. If an eligible historic property cannot be avoided, Western would prepare a treatment plan per the PA.	X	X	X
Per the PA, Western would make determinations of eligibility and effect in consultation with the PA signatories and appropriate tribes. Foresight and Western would act in accordance with the PA's unanticipated discovery provisions.	X	X	X
Per the PA, the appropriate tribal representatives, SHPO, and Forest archeologist (if on Forest Service-managed lands) would be contacted if a burial site is encountered during construction in accordance with the PA's unanticipated discovery provisions and the Native American Graves Protection and Repatriation Act.	X	X	X
No surface disturbance would occur within the boundary of any NRHP-eligible property prior to completion of a treatment plan that would be reviewed and approved by the PA signatories.	X	X	X
No surface disturbance would occur within the boundary of a site identified and recommended for listing under NRHP until its eligibility is determined. If a site is determined to be eligible, no surface disturbance would occur within the boundary of the site prior to completion of a treatment plan that would be reviewed by the PA signatories.	X	X	X

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
Prior to construction, all construction personnel would be instructed on the protection of cultural, paleontological, and ecological resources. To assist in this effort, the construction contract would address (a) Federal, State, and Tribal laws regarding cultural resources, fossils, plants and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them.	X	X	X
GEOLOGY AND SOILS			
Except where necessary for the safe installation of the new structures, measures would be taken to confine vehicle traffic to the existing roads and minimize the disturbances to the soil protective mechanisms (i.e., vegetation and soil crusts).			X
If soil moisture would cause off-road rutting by construction equipment, movement of construction equipment could be temporarily discontinued as directed by the Forest Service for project elements located on Forest Service-managed lands.			X
Temporary construction areas, access road buffer zones, temporary construction roads, and staging areas would be restored to a condition similar to that which existed prior to disturbance where practicable. Where necessary, land would be restored with natural contours and revegetation with native species so as to avoid impact to natural drainages, water quality or visual resources.	X	X	X
Foresight would use BMPs described in FSH 2509.22 during construction and operation of the proposed transmission tie-line to protect topsoil and to minimize soil erosion. Practices could include: • containing excavated material; • applying water, gravel, or other surface palliative; • use of silt fences; • protecting exposed soil with fabrics (especially near wetlands); • stabilizing restored surfaces; and/or • revegetating disturbed areas.	X		X
Construction managers would be careful to stabilize disturbed soils promptly to avoid erosion and invasive weeds. Disturbed areas would be seeded with a mix chosen with assistance from the landowner or land management agency to ensure it would meet their objectives.	X		X
Areas disturbed during site grading outside the switchyard's footprint and at the switchyard construction staging area would be regraded so that all surfaces drain naturally, blend in with the natural terrain, and prevent erosion or transport of sediments. If revegetation is required by the Forest Service, Western would use seed mixtures as recommended by the Forest Service.		X	X
Construction activities and revegetation efforts would avoid, to the extent feasible, spreading subsurface soils over or mixing them with surface soils.			X

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
AIR QUALITY			
Unpaved access roads and areas scheduled for earthmoving activities would be watered, graveled, or treated on a regular basis to minimize dust. Oil shall not be used as a dust suppressant.	X	X	X
Stockpiled soils or materials shall be covered, watered, or treated with a palliative for a visible crust when not currently being used.	X		
Vehicles traveling on unpaved surfaces shall be restricted to 25 mph to minimize the creation of dust.	X		
Western's contractor and subcontractor machinery shall have, and shall use, the air emissions control devices required by Federal, State or local regulation or ordinance.		X	
Western's contractor shall remove all waste material from the construction site; no waste shall be left on Western property, right-of-way, or easement. Burning or burying of waste material is not permitted.		X	
Dump trucks would be covered before traveling on public roads.	X		
Equipment would be shut off rather than left idling between uses unless that equipment requires a significant start up or idling prior to use for proper operation.	X		X
The rock crusher would contain dust-suppression features including screens and water-spray.	X		
Operation of the rock crusher and concrete batch plants would require individual minor source permits or a combined general permit from Arizona Department of Environmental Quality (ADEQ). The construction contractor would obtain authorization to operate under the general permits available for these facilities and would comply with all terms and conditions of the permit(s).	X		
Ground-disturbing construction activities would be restricted during high-wind events, and water or other palliative treatment would be applied as necessary to active earthmoving areas to minimize non-point source emissions of particulates.	X		X
To control emissions from material handling and loading activities, transfer points would be enclosed or water sprays or other palliative treatments would be used.	X		X
Foresight would require its contractor to use equipment that meets current EPA emissions performance standards for engines between 100–175 horsepower.	X		X
Foresight would require its contractor to use ultra-low sulfur diesel fuels for all equipment for which such fuel is technically feasible to substantially reduce tailpipe emissions of SO_2 and PM_{10}.	X		X
Western would ensure that construction activities and the operation of equipment are undertaken to reduce the emission of air pollutants by requiring its construction contractor to submit a copy of permits for construction activities, if required, from Federal, State, or local agencies 14 days prior to the start of work.		X	

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
WATER RESOURCES			
Foresight would avoid, to the extent possible, placing temporary or permanent facilities in floodplains and washes.	X		X
Construction activities would be conducted in a manner to minimize disturbance to floodplains, vegetation, drainage channels, and stream banks.	X	X	X
Foresight's final layout plan for initial and subsequent phases would avoid features identified as jurisdictional waters of the U.S., or reduce the quantity of jurisdictional waters impacted, by locating WTGs outside of jurisdictional waters and aligning access roads and utility infrastructure parallel to identified crossings to avoid perpendicular crossings, to the extent feasible. Where crossings cannot be avoided engineered controls would be implemented during construction to minimize impacts to the watershed by maintaining pre-development flow conditions in downstream reaches. Engineered controls would include, to the extent practicable, locating crossings to minimize adverse effects by using culverts, low-water crossings, or energy dissipation treatments; burying utilities below the grade of a water course; or using directional drilling by boring the planned utility under an affected watercourse.	X		X
An Arizona Pollutant Discharge Elimination System (AZPDES) permit would be obtained and a Stormwater Pollution Prevention Plan (SWPPP) prepared for disturbed areas include staging, parking, fueling, stockpiling, and any other construction related activities. The SWPPP would include both structural and non-structural BMPs.	X	X	
Foresight would use BMPs during construction, operation, and maintenance of the site to protect topsoil and water resources and to minimize soil erosion. Practices could include containing excavated material, applying water or other palliative treatment, use of silt fences and fabrics, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas with native species.	X		X
BMPs would be adopted as part of the SWPPP to implement good housekeeping, preventive and corrective maintenance procedures, steps for spill prevention and emergency cleanup, employee training programs, and inspection and record keeping practices, as necessary, to prevent storm water pollution.	X	X	
Site-specific BMPs would be identified on the construction plans for the site slopes, construction activities, weather conditions, and vegetative buffers. The sequence and methods of construction activities would be controlled to limit erosion. Clearing, excavation, and grading would be limited to the minimum areas necessary to construct the project.	X		X
In addition to BMPs in the SWPPP, Foresight would adhere to site specific BMPs identified by the Forest Service in its special use permit.	X		X

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
A Spill Prevention, Control, and Countermeasure (SPCC) Plan would be prepared before construction to identify procedures for preventing spills of pollutants including hazardous materials and for responding appropriately if a spill occurs.	X		X
Western would ensure that its construction contractor obtains a dewatering permit from the appropriate agency if required for construction dewatering activities.		X	
Foresight would ensure that hazardous materials, fuels, and lubricants shall not be drained onto the ground or into drainage areas.	X		X
Watering facilities and other range improvements would be repaired or replaced if they are damaged or destroyed by construction activities to their condition prior to disturbance, as agreed to by the parties involved.	X		X
Western would require that its construction contractor control runoff from excavated areas and piles of excavated material, construction material or wastes (to include truck washing and concrete wastes), and chemical products such as oil, grease, solvents, fuels, pesticides, and pole treatment compounds. Excavated material or other construction material shall not be stockpiled or deposited near or on stream banks, lake shorelines, ditches, irrigation canals, or other areas where run-off could impact the environment.		X	
Western would not permit the washing of concrete trucks or disposal of excess concrete in any ditch, canal, stream, or other surface water. Concrete wastes shall be disposed in accordance with all Federal, State, and local regulations.		X	
TRANSPORTATION			
Foresight would comply with all local, State, and Federal transportation regulations and would develop a traffic control plan in consultation with the Coconino County Public Works Department prior to wind park and/or transmission tie-line construction activities.	X		
Damage to existing public roadways caused by wind park and/or transmission tie-line construction would be repaired to pre-construction condition in accordance with the appropriate jurisdictional authority.	X		
Wind park and/or transmission tie-line construction crews would use regulation-sized vehicles, except for specific construction equipment which could haul oversized loads.	X		
Local hauling permits from appropriate agencies would be obtained prior to wind park and/or transmission tie-line construction and adhering to their conditions.	X		
Wind park and/or transmission tie-line construction equipment transport and deliveries would be scheduled to occur during the day to the extent practical to limit additional traffic during commuting hours.	X		

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
Foresight would obtain Determination of No Hazard Air Navigation Permits for all structures over 200 feet from the FAA and an FAA-approved Lighting Plan.	X		
HEALTH, SAFETY, AND SECURITY			
During wind park and/or transmission tie-line construction, standard health and safety practices would be conducted in accordance with the most recent Occupational Health and Safety Administration's (OSHA) policies and procedures.	X		
For the switchyard, Western's construction contractor would comply with the latest effective OSHA standards and other applicable Federal, State, and local regulations. During operations, facility maintenance would be conducted in accordance with Western's Power Safety Manual, which meets or exceeds OSHA requirements.		X	
Risk of construction-related injury would be minimized through regular safety training for construction personnel, use of appropriate safety equipment, and compliance with applicable construction safety standards.	X		
Foresight would develop and implement an Emergency Response Plan for use during wind park and/or transmission tie-line construction and operation. The Plan would contain emergency fire precautions, notification procedures, and emergency response sequences.	X		
Security measures would be taken during construction and operation, including temporary and permanent (safety) fencing at the substations, warning signs, and locks on select equipment and WTGs. Turbines would sit on steel-tubular towers. All electrical equipment would be located within the towers except for the pad-mounted transformer and collection system. Access to the tower would be through a steel door that would be locked when not in use.	X		
Western's security measures, to be taken during construction and operation of the switchyard, would include temporary and permanent (safety) fencing at the switchyard and warning signs.		X	
Access to the wind park and/or transmission tie-line construction site would be monitored, to the extent possible, to avoid unauthorized public access.	X		
Signs would be posted at the entrance of wind park access roads to alert the public and maintenance workers of potential ice shedding risks.	X		
Western would require its construction contractor to provide a Tanker Oil Spill Prevention and Response Plan as required by the U.S. Department of Transportation, if oil tankers with volume of 3,500 gallons or more are used as part of the project.		X	

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
During the design of Western's proposed switchyard, a determination would be made on the need for secondary containment per SPCC Plan requirements. If required, secondary containment would be installed within the substation to prevent the migration of oil from the switchyard site.		X	
Material Safety Data Sheets for potentially hazardous materials would be provided to local fire and emergency service personnel and to land management agencies.	X		
As dictated in the SPCC Plan, hazardous materials and petroleum products would be handled in accordance with applicable local, State and Federal laws and regulations. Totally enclosed containment would be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.	X		X
As dictated in the SPCC Plan, fuel or hazardous waste leaks, spills, or releases would be reported immediately to the appropriate land management agencies that administer the land where the incident occurs, as well as appropriate State or Federal agencies that regulate spills.	X		X
The proposed transmission tie-line would be designed and operated to comply with industry best practices for controlling electric and magnetic fields.	X		
Western would require its construction contractor to dispose or recycle waste material in accordance with applicable Federal, State, and local regulations and ordinances. No waste shall be left on Western property, right-of-way, or easement. Burning or burying of waste material is not permitted.		X	
Western would develop a Fire Plan, approved by the Forest Service, for the construction, operations, and maintenance of the proposed switchyard.			X
Foresight would develop a Fire Plan, approved by the Forest Service, for the construction, operations, and maintenance of the transmission tie-line.	X		X
NOISE			
All engine-powered equipment would have mufflers installed according to the manufacturer's specifications and would comply with applicable equipment noise standards.	X		
Wind park and/or transmission tie-line construction crews would locate stationary construction equipment a minimum of one-half mile from residences.	X		
Wind park and/or transmission tie-line construction operations would be primarily scheduled during daylight hours.	X		X
Residences within a mile of the wind park study area and land management agencies would be notified whenever extremely noisy work, including blasting, would occur.	X		

TABLE 2.7-1 PROJECT RESOURCE PROTECTION MEASURES			
Resource Protection Measure	**Foresight (Wind Park and Tie-line)**	**Western (Switchyard)**	**Coconino NF (Tie-line and Switchyard)**
If helicopter construction is required, helicopter staging areas would be sited a minimum of one mile from residences. In addition, helicopter pilots would be instructed to avoid flight paths over residential areas, or other sensitive receptors.	X		
VISUAL RESOURCES			
Clearing of the transmission tie-line right-of-way shall be performed so as to minimize landscape impact and preserve the natural beauty to the maximum extent possible. Except for danger trees, no clearing shall be performed outside the limits of the construction right-of-way.	X		X
Industry-standard finishes (neutral white or gray) would be used for the WTG towers, nacelles, and rotors to minimize contrast with the sky backdrop.	X		
Neutral gray and non-reflective finishes would be used for all permanent structures that are part of the transmission tie-line. Non-reflective steel should be used in the switchyard where possible due to forested nature of that site.	X		X
Exterior lighting on the turbines required by the FAA would be kept to the minimum number and intensity required to meet FAA standards.	X		
Outdoor lighting at the O&M facility, substations, and switchyard would be limited to the minimum required for safety and security. Except for the switchyard, sensors and/or switches would be used to keep lighting turned off when not required. Light fixtures would minimize backscatter and offsite light as required by the Coconino County lighting ordinance and would utilize down-shields where appropriate.	X	X	X